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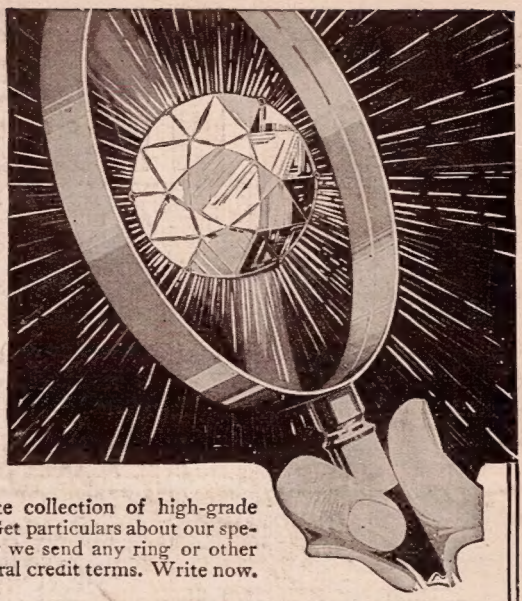

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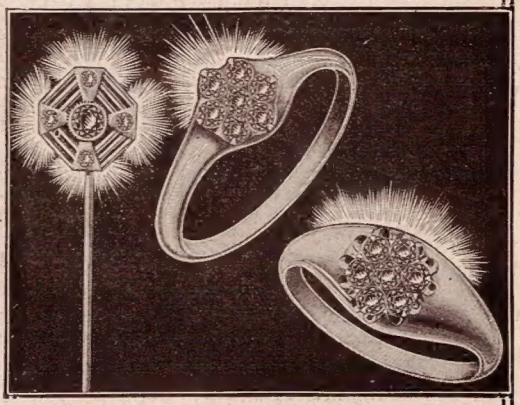

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RAILROAD MAN'S MAGAZINE

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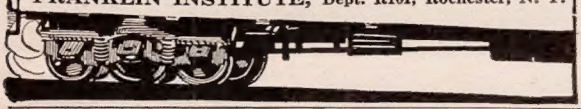

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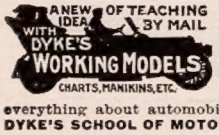

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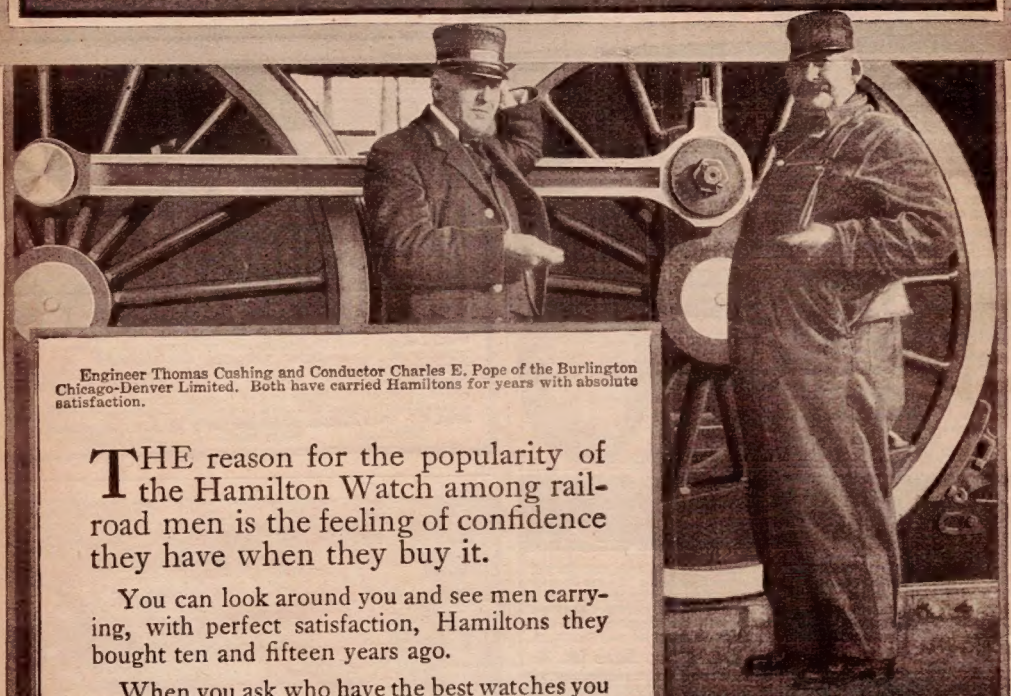

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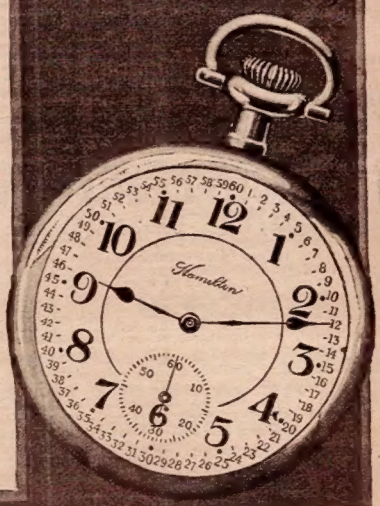

THE RAILROAD MAN'S MAGAZINE

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BIG RAILROADING—7.

"THE BRIDGE THAT MUST BE BUILT"—DESPITE TWO DISASTERS, CANADA STILL WILLS IT TO SPAN THE ST. LAWRENCE.

WHEN QUEBEC'S NEW CANTILEVER PROVIDES A HIGHWAY OF STEEL FOR NORTH AND SOUTH BOUND TRAINS, THE DOMINION WILL HAVE THE WORLD'S SUPERLATIVE ENGINEERING ACHIEVEMENT TO ITS CREDIT—STRUCTURE A HALF-MILE LONG, WITH CENTRAL SPAN 150 FEET ABOVE WATER AND 1,800 FEET LONG IN THE CLEAR.

BY CHARLES FREDERICK CARTER,

Author of "When Railroads Were New."

IT was considered quite a feat to put up the Woolworth Building, which towers some seven hundred and odd feet above lower Broadway in New York City. But all the weight of the superstructure rests squarely upon its foundations, with no overhang, while the "live load" it bears is relatively light.

Try to imagine, then, what an infinitely greater task it would be to construct the steel frames of two Woolworth Buildings, much longer and very much heavier than that of the one in New York, lay them down on their sides so that their immense lengths extended horizontally out over a river, instead of vertically above solid ground, balance each one on a single

IF THE SUSPENDED SPAN OF THE QUEBEC BRIDGE HAD BEEN BUILT IN CITY HALL PARK, NEW YORK CITY, INSTEAD OF AT SILLERY COVE IT WOULD HAVE STRETCHED FROM THE WOOLWORTH BUILDING THREE BLOCKS TO THE NORTH, WHILE THE TOP OF THE TRUSSES WOULD HAVE BEEN ON A LEVEL WITH THE EIGHTH FLOOR OF THE OFFICE BUILDINGS ALONG THE WAY.

Reproduced by courtesy of the Scientific American.

support near its center, and then hoist a third Woolworth Building up one hundred and fifty feet into the air from the projecting ends of the first two to make a single united structure considerably more than half a mile long of the three.

Then if your imagination does not break down under the strain, picture to yourself two trains, each weighing five thousand pounds per lineal foot and each hauled by two large locomotives trundling across the whole.

If you can do all this, you will have some sort of basis from which to work out a more or less satisfactory conception of the Quebec Bridge, which is not only the greatest thing of the kind ever undertaken, but which, it is conceded, will be the world's superlative engineering achievement.

Should faltering credulity need the stimulus of some comparisons at this point, here they are. Of course you understand that, so far as total length is concerned, the Quebec Bridge is no great shakes. There are plenty of bridges that surpass it in this respect. No; the feature that makes the Quebec Bridge wonderful is its central span, which measures 1,800 feet in the clear.

Other Bridges Are Longer, but—

The nearest approach to this remarkable span is to be found in the famous railroad bridge across the Firth of Forth at Queensferry, Scotland, completed in 1889, which has two chief spans each 1,710 feet in the clear, or 90 feet less than the Quebec Bridge.

The total length of the Firth of Forth Bridge is 8,296 feet, or a little more than a mile and a half, as compared with 3,239 feet, the total length of the Quebec Bridge.

But the latter contains 65,000 tons of steel as compared with 44,500 tons in the Scotch structure. When you get right down to cases, you see, the Scotch bridge which started out with such a brave showing hardly deserves to be included among those present.

Coming to the United States, the best we can do in the way of long spans is to present the claims of the Manhattan Bridge across the East River in New York City, which stretches 1,600 feet between towers. The old Brooklyn Bridge is 1,595 feet between towers.

But the Quebec Bridge contains steel enough to make nine suspended spans for the old Brooklyn Bridge and still have enough left over to make a very respectable ordinary railroad bridge.

And, anyway, the two New York City bridges just mentioned are suspension affairs, whereas the Quebec Bridge is a cantilever, which is quite different. At least, you would think so if you had to build one.

World's Greatest Cantilever Structure.

In plain English, a cantilever is nothing more nor less than a bracket resting on a pier and so balanced and secured that the extended arm will support both its own weight and that of the loads moving across.

This bracket is connected at its mid-river extremity by means of a suspended girder span with a similar bracket reaching out from the opposite shore.

In cantilevers we have nothing in stock worthy of being mentioned in the same number with the magnificent structure at Quebec. If you insist on figures, there is the Niagara cantilever bridge, built in 1883, the first sizable structure of its kind in this country, with a span of 910 feet 295 feet above the water.

The Blackwell's Island cantilever bridge in New York City has two chief spans of 846 feet each 135 feet above the water, as compared with 150 feet for the Quebec Bridge.

Not merely in size, but in other attributes, the Quebec Bridge surpasses all others. No other presented so many difficulties for the engineers; never has genius scored so many brilliant triumphs in surmounting these difficulties, and no other engineering undertaking has undergone such spectacular disasters.

Canada has paid a high price for this engineering masterpiece, as yet unfinished. The bill includes such items as many years of perseverance in the face of discouraging odds, scores of lives, and $27,000,000 in cold cash, to which must be added at least $600,000 more.

The greatest engineering disaster in history occurred August 29, 1907, when the south cantilever arm, which was almost completed, collapsed, carrying down to death seventy-four men.

Twenty-four hours before the bridge went down I walked out upon it to talk with General Foreman Yenser. A gale blowing from the northwest suggested such unpleasant possibilities that I asked Yenser if there was any danger of the bridge going down.

"Oh, that's impossible," he replied. "Why, this bridge is as solid as the eternal hills."

Next day his body lay with seventy-three others somewhere among twenty thousand tons of twisted and tangled steel at the bottom of the river.

Only 11 of 85 Escaped in Crash.

Evidence at the coroner's inquest showed that at the time I had questioned him Yenser was greatly alarmed about the impending danger; for two days before inspectors had discovered that one of the bottom chord members had begun to buckle, and Yenser and his associates had realized what it meant, but had allowed the resident engineer to talk them into continuing at work.

Of the eighty-five men on the bridge at the time it went down but eleven escaped. One of them was walking ashore within fifty feet of the end of the approach span when he felt the bridge sinking under him.

He ran for his life, reached safety, and turned in time to see the end of the disaster. The bridge settled vertically, slowly at first, then suddenly with a grinding noise, ending in a terrific crash and splash.

THE COMPLETED CANTILEVER ARMS OF THE QUEBEC BRIDGE REACHING OUT TOWARD EACH OTHER FROM OPPOSITE SIDES OF THE ST. LAWRENCE WAITING, WITH HANGERS IN PLACE, FOR THE SUSPENDED SPAN TO LINK THEM TOGETHER. THE CANTILEVER ARMS, THAT IS, FROM THE PIERS TOWARD THE CENTER OF THE RIVER, ARE 580 FEET LONG. THE 13,000 TONS OF STEEL IN THE ONE ON THE RIGHT WAS ERECTED IN 92 WORKING DAYS.

Official photograph by E. M. Finn, Staff Photographer St. Lawrence Bridge Co.

The most wonderful escape was that of a locomotive engineer who was pushing a car of material out on the cantilever arm. He felt the structure sinking under him, and thought it might be well to shut off.

His engine kept right on going, though, slowly at first, then fairly scooted down the toboggan into the St. Lawrence in two hundred feet of water, taking the engineer with it.

The next thing he knew some one was fishing him out of the river by the scruff of the neck.

Disaster Again.

Even more spectacular was the second disaster, when the suspended span tumbled down into the middle of the river while it was being hoisted into position Monday, September 11, 1916, although it was not so costly in life nor in money loss.

More than fifty thousand persons, including upward of a hundred of the most eminent engineers in the United States and Canada, witnessed this second disaster. Some of them took part in the *post mortem* by which exactly what happened was ascertained.

It was an accident that could not have been foreseen, apparently, but the St. Lawrence Bridge Company, Limited, the construction company, promptly issued a statement voluntarily assuming all responsibility and offering to replace the lost span at its own expense, thereby proving that it was a good sport.

In order to appreciate the magnitude of the disaster, it is well to understand some of the steps by which this engineering marvel approached its finishing stage.

While the investigating commission was still trying to apportion the blame for the disaster of 1907 the Canadian government resolved that the bridge should be rebuilt. An engineering commission was appointed to undertake the task. The first thing done was to study the causes of the collapse in order that they might be avoided.

Then two years were devoted to building the bridge on paper. The first design didn't look right after it was finished; so, after much discussion, the engineers went to the alphabet for the basic idea, and the thing was done. The outstanding feature of the bridge is a line of gigantic letter K's, like this: KKKKKKKKK.

When the design was finally completed the details were worked out with such absolute precision that the bridge could have been put together in the dark. There was only one hitch in the entire process of construction of any consequence, and that was due to an accident that could not have been foreseen.

To a disinterested observer it would seem as if the principal reason for building the Quebec Bridge must have been that the site was obviously such a fine place for a bridge.

Remember that picture in your physiology illustrating the evil effects of lacing too tight? Well, the St. Lawrence River bears all the outward evidences of overindulgence in corsets; for nine miles above Quebec it is squeezed almost in two, bulging out above and below in a most ungraceful way, just like that picture in the physiology.

Site Made by Nature.

This wasp-waisted river is here less than half a mile wide, while the banks on both sides are cliffs rising almost vertically from the water's edge to a height of a hundred and fifty feet. A bridge could be built here high enough to clear an ocean-going steamer at a cost of nothing worth mentioning in particular for approaches.

The steamships have to be provided for, because at this point the St. Lawrence is a tidal estuary rather than a river, with tides rising and falling eighteen feet. With a depth of water of two hundred feet and a current rushing back and forth with the speed of the proverbial millrace, you can see that the bridge-builders had their work cut out for them.

It was found to be impracticable to use the old main piers, so new ones had to be

built. Bed-rock is 101 feet below high water and 70 feet below the bottom of the river. This meant a hard job in sinking caissons.

The caisson for the north-shore main pier, 180 feet long and 55 feet wide, was built of huge square timbers on ways like a ship, at Sillery, three miles down the river from the bridge site. It was launched and towed to position June 14, 1910. This was the first step in construction.

By the time the caisson had been sunk fifty feet the going was so hard that the engineers decided to stop there instead of trying to continue to bed-rock, which was located twenty feet farther down.

To make sure that stopping was safe they sent a cube of granite two feet square down into the caisson and placed it carefully on an average section of the river bottom.

SUSPENDED SPAN ON THE FALSE WORK ON WHICH IT WAS BUILT AT SILLERY COVE, ON THE AFTERNOON OF SEPTEMBER 10, 1916, WITH SCOWS SUNK IN POSITION WAITING FOR THE TURN OF THE TIDE TO COME AND LIFT THE HEAVY MASS OF STEEL OFF ITS SUPPORTS READY FOR THE THREE MILE VOYAGE UP THE RIVER.

Official photograph by E. M. Finn, Staff Photographer St. Lawrence Bridge Co.

Two thousand cubic yards of concrete were dumped into the caisson before it rested on the river bottom. It leaked and the pumps broke down, allowing the caisson to fill with water.

This caused it to rest unevenly on the big boulders so that it was so badly strained that all that two thousand yards of concrete had to be laboriously dug out and the caisson floated and towed to dry dock for repairs.

Nearly a year later it was being sunk again, but this time on the south side, where sand bottom made it safer to sink the repaired caisson. For the north side two new caissons were built, each 80 x 60, and sunk with a 10-foot space between. The best they could do was to settle the caisson at the rate of four inches a day.

Over this they placed a steel I-beam for a lever, the short end thrust under the edge of the caisson and with pin bearings on the block and caisson. Then with hydraulic jacks on the long end of the lever they tried to squeeze the block of granite clear through the earth's crust.

At thirty tons to the square foot the block never budged. When the pressure was increased to fifty-nine tons to the square foot the block settled an eighth of an inch.

As the load the pier would have to bear was only eight tons to the square foot, the engineers decided to stand pat. So the caisson was filled with concrete carefully tamped by hand. To fill in any cracks that could not be reached in any other way cement was blown in through a

four-inch pipe at a pressure of a hundred pounds to the square inch.

The south caisson, being sunk in plain sand, offered a distinct problem of its own. Sand-jacks were decided on for lowering it into place. These were steel cylinders three feet long and thirty-one inches in diameter with pistons built of heavy pine timbers. Enough of them were fastened to the bottom of the caisson to bear its entire weight.

How They Fought the Sand.

When it came to the operation of sinking, the sand-jacks were first filled with sand to the full length of their piston. They were then blocked up against the caisson. The sand was then dug out from under the cutting edge of the caisson for a depth equal to the desired drop.

The process of lowering called for some pretty fine team work. A man was stationed at each jack with a bag, all the bags being of exactly the same size. When all was ready the foreman would flash a signal with lights, whereupon each man would turn a jet of water into his jack, which washed some of the sand out into the bag he held.

When the bags were full of sand the foreman flashed another signal and the water-jets were turned off. By the time each man had filled sixteen bags with sand the caisson had settled on an even keel about two feet. Then the whole performance would be repeated from the beginning.

It was smooth sailing at first when the air-pressure in the caisson was light and a man could work eight hours on a shift. But as the caisson progressed toward the center of the earth the air-pressure had to be increased to keep the river out until a man could work only an hour at a time.

100 Feet Under, 100 Degrees Above.

It was nice and warm, at that; for air compressed at heavy pressure develops considerable heat and then the concrete poured in generated more heat in setting, so that you could depend on a hundred degrees or more. The contractor had the hardest time, for it was almost impossible to find men enough to keep things going as the caisson neared the hundred-foot mark below high water.

Engineering science has made the discovery that men are the most valuable machines about the works. So dormitories and dining-rooms were put up for the sandhogs right beside the job, and they were fed as carefully as a boiler is fired and they did not have to waste steam walking to and from their work.

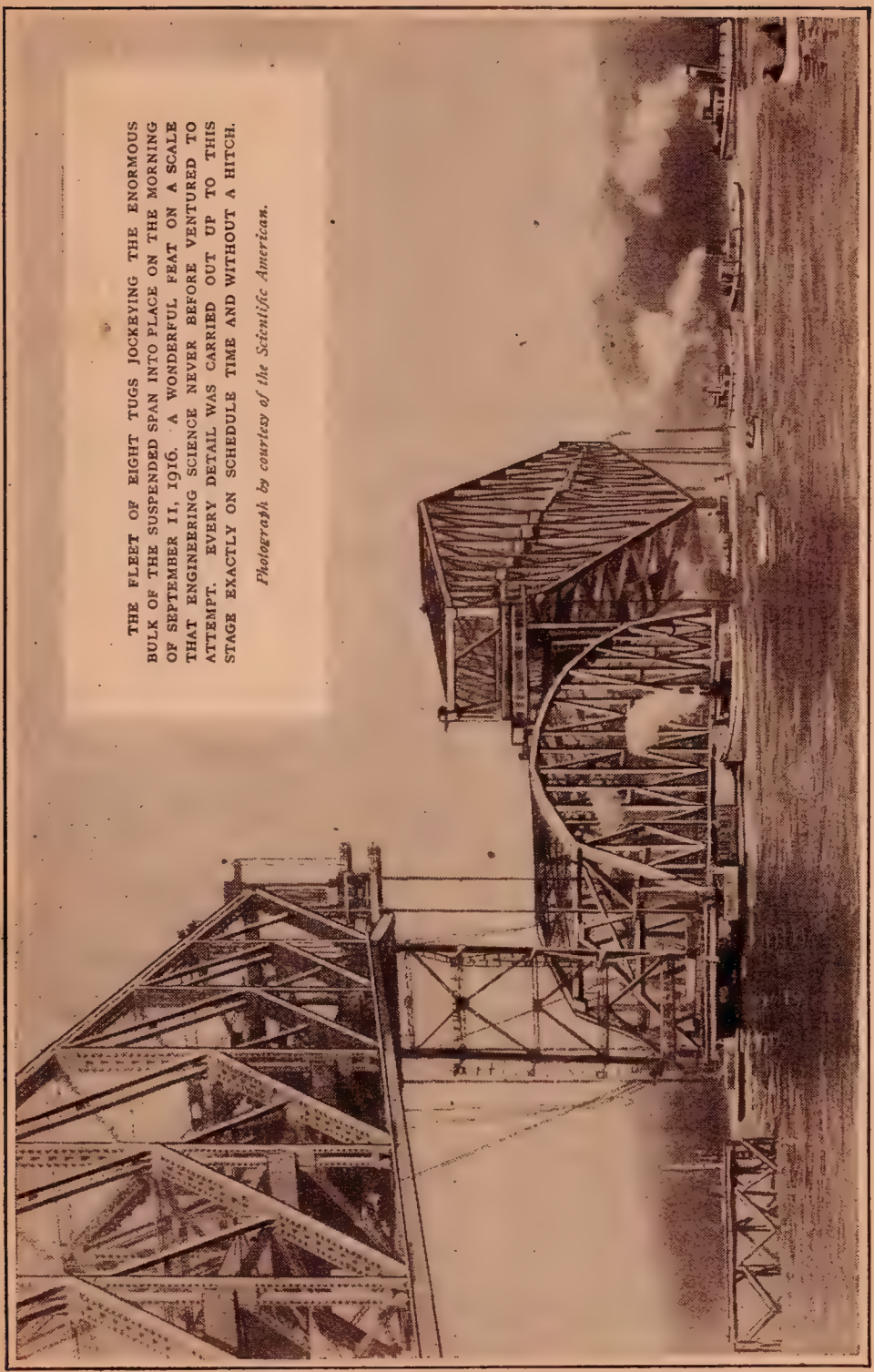
This same idea was carried out right through. When work on the superstructure began elevators were installed to take the workmen up and down. The strength required to climb a hill a hundred and fifty feet high would drive a good many rivets; and the contractor got paid for every rivet driven on the job, whereas he didn't draw a red cent for the unnecessary steps the men took.

A Life-Guard for the High-Divers.

When I was on the bridge in 1907 a life-guard always sat during working hours in a boat moored to the end of the bridge by a painter about two hundred feet long. When a man fell overboard the life-guard could cast loose by a single motion and with a few strokes reach the spot where the victim went down.

The only trouble was that after a man had pitched into deep water from an elevation of three or four hundred feet he often forgot to come up again. About the only chance the life-guard got to earn his salary was when some prying curiosity-seeker who had slipped past the signs warning him off, not to mention the watchmen on duty, walked off the end of the bridge into the St. Lawrence.

Such is the perversity of human nature that these tempters of fate would usually come to the surface and stay there until the life-guard would practically have to fish 'em out. It did seem as if these people were bent on making all the trouble they could, instead of drowning quietly as their folly deserved.



THE FLEET OF EIGHT TUGS JOCKEYING THE ENORMOUS BULK OF THE SUSPENDED SPAN INTO PLACE ON THE MORNING OF SEPTEMBER 11, 1916. A WONDERFUL FEAT ON A SCALE THAT ENGINEERING SCIENCE NEVER BEFORE VENTURED TO ATTEMPT. EVERY DETAIL WAS CARRIED OUT UP TO THIS STAGE EXACTLY ON SCHEDULE TIME AND WITHOUT A HITCH.

Photograph by courtesy of the Scientific American.

But when it came to rebuilding, a new plan was adopted. Instead of requiring men to hang on to steel columns like a woodpecker on a limb, swinging cages and platforms, broad and easy stairs and runways, all equipped with ample railings, were provided, so that nothing short of inspired awkwardness could possibly cause one to fall overboard.

But this is getting ahead of the story.

When the piers were completed, the next step was to place the shoes in position. They were some shoes, believe me!

"Shoes" as Big as Cabooses.

There were four of these main shoes, one for each of the two main towers on each main pier to stand in. Each shoe had to support a vertical load of 55,000,000 pounds and resist a horizontal thrust, tending to slide it off the pier, of 32,000,000 pounds.

The base of each shoe measured 26 feet 4 inches by 20 feet 10 inches and was 19 feet high. They were of steel, of course. Such enormous masses of metal had to be built up piecemeal in three stories.

The ground floor consisted of four steel castings 4 feet high and each weighing 40 tons. The webs and flanges were 2½ to 3 inches thick, and the pieces were bolted together with 2½-inch bolts.

There is a coefficient of friction of thirty per cent between steel and masonry; but to help take care of that 32,000,000 pounds horizontal reaction, each shoe was hobnailed with 44 3-inch anchor-bolts and dowels.

The second story of the shoes was built up of steel webs, making in some places solid masses 9½ inches thick held together with rivets a foot long. It is calculated that the maximum load on these shoes will

THE SUSPENDED SPAN, 640 FEET LONG, WITH 5,000 TONS OF THE 6,000 IT WAS TO CONTAIN WHEN FINISHED, HANGING ABOUT TWELVE FEET ABOVE THE SURFACE OF THE RIVER JUST A MOMENT BEFORE THE ACCIDENT. AT THE RIGHT CAN BE SEEN A PART OF THE FLEET OF STEAMSHIPS CARRYING A PORTION OF THE CROWD OF FIFTY THOUSAND PERSONS WHO SAW THE DISASTER.

Official photograph by E. M. Finn, Staff Photographer St. Lawrence Bridge Co.

amount to a pressure of 660 pounds per square inch on the granite masonry of the pier.

But then there is the wind to take care of. The transverse wind load is figured at 1,300,000 pounds; the longitudinal load 6,200,000 pounds. These wind-loads are expected to produce at times a torque that will cause the toes of the shoes to dig into the granite with a pressure of 915 pounds to the square inch.

Steel Fabricated with Watchmaker's Care.

More marvelous than the mere size of these gigantic shoes was the unbelievable accuracy with which they were made. The 440 tons of steel constituting each shoe was set up in the shop and lined up with field level and transit and other special appliances, and all the five holes for the thirty-inch steel pins to hold the chords bored at one setting.

Then the loose parts were stenciled and their abutting faces chisel-marked so they could be reassembled in their final position with absolute accuracy. No finer work was ever done on a high-grade watch than was done on the massive steel parts of the Quebec Bridge. Every other member was finished with the same accuracy that was bestowed on the shoes.

The metal work was carried out to such a fine point that the engineers on the job could hardly credit their own senses. For instance, they found that the main posts, when in their final positions, were within the two-thousandth part of a foot of their calculated height for a given temperature.

Accordingly they had to check and recheck their measurements with that tireless reiteration of which a civil engineer alone is capable before they could believe it. You will be good enough to remember that these main posts are 10 feet square and 310 feet high, center to center of pins, and weigh 1,500 tons each.

In building a structure of such unprecedented size entirely new methods had to be arranged. Most of the steel parts or "members," as the engineers call them, of the trusses were so enormous that each had to be divided into several parts to get them down to dimensions that could be shipped from the shops and handled by the cranes in erecting them.

These things, together with the fact that such unparalleled accuracy was required, and the further fact that the 65,000 tons of steel that make up the bridge had to be manufactured in about three years, led to the provision of a special shop near Montreal.

This shop was 160 feet wide and 650 feet long, with the usual storage yard at one end to receive the steel as it came from the mills and a storage yard and shipping-shed for the completed pieces at the other end, whence the material could be forwarded to the bridge as it was required.

The machine tools in this shop were in keeping with the structure they were designed to serve. The first process was to straighten out the steel plates so the templets would lie flat while the laying out was done.

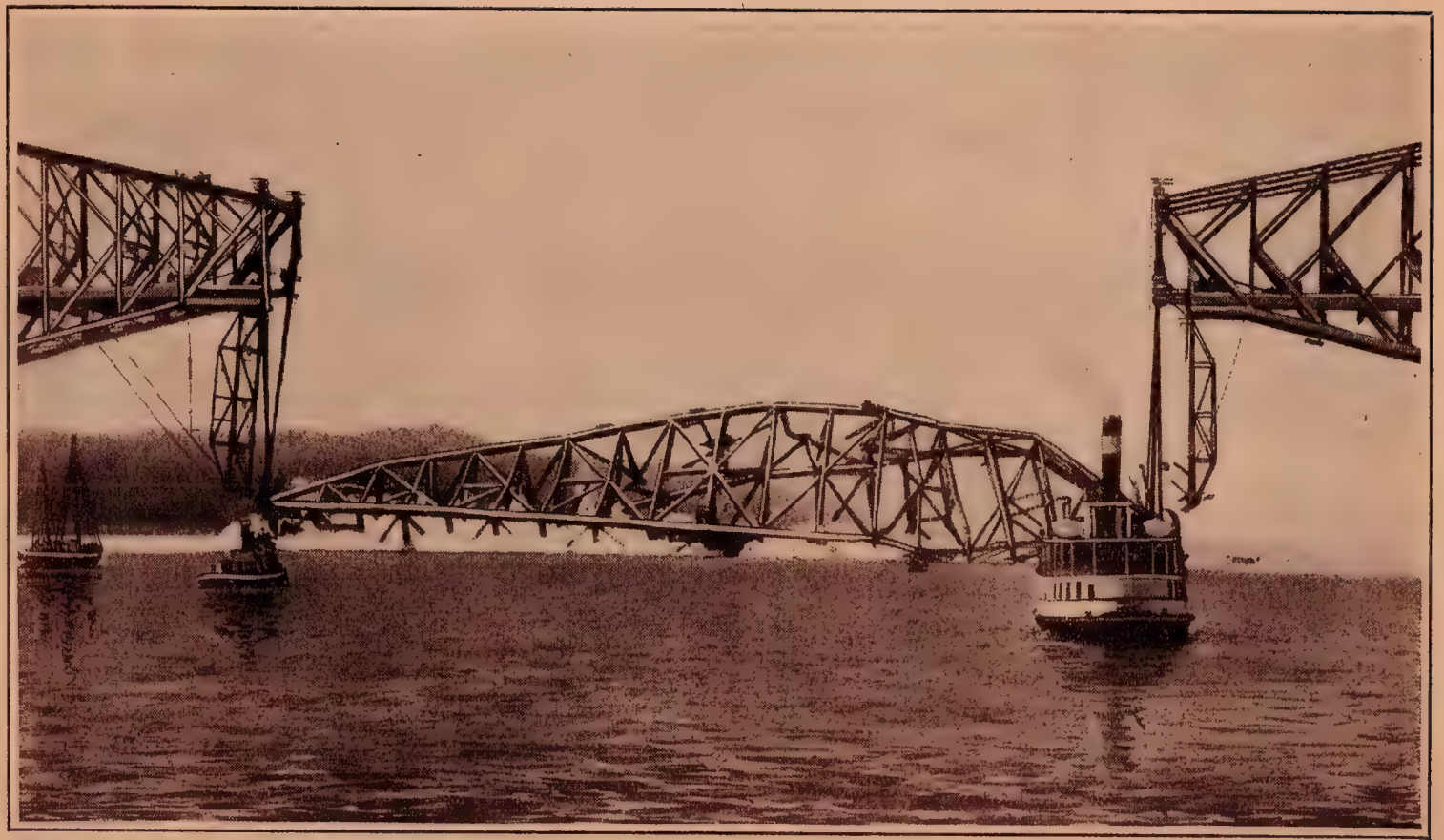
This was done by heavy plate rolls served by a sixty-foot roller table with five air-hoists, each of three tons capacity, capable of straightening out a plate of nickel steel 10 feet wide and ¾ of an inch thick, or 7 feet wide by 1⅜ inch thick.

Steel Plate Tailored with Shears.

Next, the material was cut to pattern by a pair of shears that would cut a nickel steel plate 7 feet wide and 1¼ inches thick at a single snip. But as the shears did not leave a very clean cut the edges had to be planed off in a machine that would take a cut 45 feet long.

In such important work it would not do to punch rivet-holes; so batteries of sixteen non-vibrating radial drills hurried the work along.

Great care was taken to obtain perfectly cylindrical holes exactly at right angles to the surface of the metal. In some cases the holes were drilled three-sixteenths of an inch smaller than the rivet and then reamed out one-sixteenth of an inch larger than the rivet when the pieces were



THE MAN WITH THE CAMERA WAS RIGHT ON THE JOB, FOR HE CAUGHT THIS REMARKABLE PHOTOGRAPH AS THE SUSPENDED SPAN WAS IN THE VERY ACT OF PLUNGING INTO THE RIVER. NOTICE HOW THE NICKEL STEEL MEMBERS ARE CRINKLING AND BENDING AT THE TOP AND SIDES OF THE TRUSSES AS THE STRUCTURE CORKSCREWED AWKWARDLY INTO THE WATER.

From a copyrighted photograph by International Film Service, N. Y.

assembled; for everything was assembled at the shops to insure a perfect fit when erection began. No chances were taken.

One of the monster machines provided to insure this perfect accuracy was a duplex rotary planer capable of planing simultaneously both ends of a member up to ninety feet long. When the job was done there could be no doubt that the two faces were absolutely parallel.

Yet another machine bored the pin-holes, which were all sizes up to thirty inches in diameter, for the pins that held the parts of the bridge together. The holes were bored in riveted members after all the riveting was completed, the entire process of boring through all the webs and component parts being completed at one operation, during which the temperature was kept as nearly uniform as possible.

A piece of steel is not the same length at eighty degrees temperature, for instance, as it is at a temperature of thirty degrees.

Measurements, of course, were carefully made. All finished measurements were made with standardized tapes lying flat and supported at frequent intervals under a tension of ten pounds.

Fine machine work is all well enough, and the sinking of caissons a hundred feet below high-water mark may furnish fascinating problems for the engineer; but when it comes to spectacular performances that thrill the casual observer it is necessary to turn to the erection of the bridge itself.

A Crane Fifteen Stories High.

This was accomplished by means of a machine without a parallel in the annals of engineering. This was the traveler, a steel-framed affair 54 by 37 feet and as high as a fifteen-story building, surmounted by a trussed bridge overhanging either side of the tower parallel to the main trusses of the bridge.

This overhanging bridge carried two traveling cranes each with two hoisting machines, capable of lifting 55 tons apiece. Each traveling crane was also equipped with a gantry crane with two five-ton hoists. The trussed bridge referred to allowed the cranes to travel a distance of 119 feet 9 inches at a height of 192 feet above the bridge floor.

The 55-ton loads were carried by ten-part falls of ⅞-inch steel rope winding in two parts on barrels 3 feet in diameter and driven by 75 horse-power motors capable of lifting a full load at a speed of 12 feet per minute.

Derrick 97 Feet in Air.

Half-way up the tower, or 97 feet above the rail, there was a derrick with a 70-foot boom capable of lifting 15 tons at each of the four corners. Down on the fourth floor was still another derrick. Altogether there were 27 motors with a total of 823 horse-power on the traveler.

This wonderful machine, capable of handling two great masses of steel on opposite sides of the bridge simultaneously, was operated by a crew of only ten men, six of them on the operating floor at the third story, and two on each of the two traveling cranes at the top.

At the front of the operating deck was a bridge, like that on a steamship, from which all sides of the traveler were visible. Telephones running from the operating deck to the stations for the men on the hoists guarded against accidents.

This centralized control made it possible for one man on the bridge to move cranes and booms together as if they were interlocked, and to hoist loads on opposite sides absolutely synchronously.

By way of example, two members of diagonals on opposite sides of the bridge, each weighing seventy-three tons, were hoisted and set in forty minutes by the watch with very little signaling and no expenditure of lung-power. Why, the building of the Quebec Bridge with the wonderful appliances provided was so easy that it seemed a shame to take money for it!

This wonderful traveler was built of nickel steel, which is forty per cent

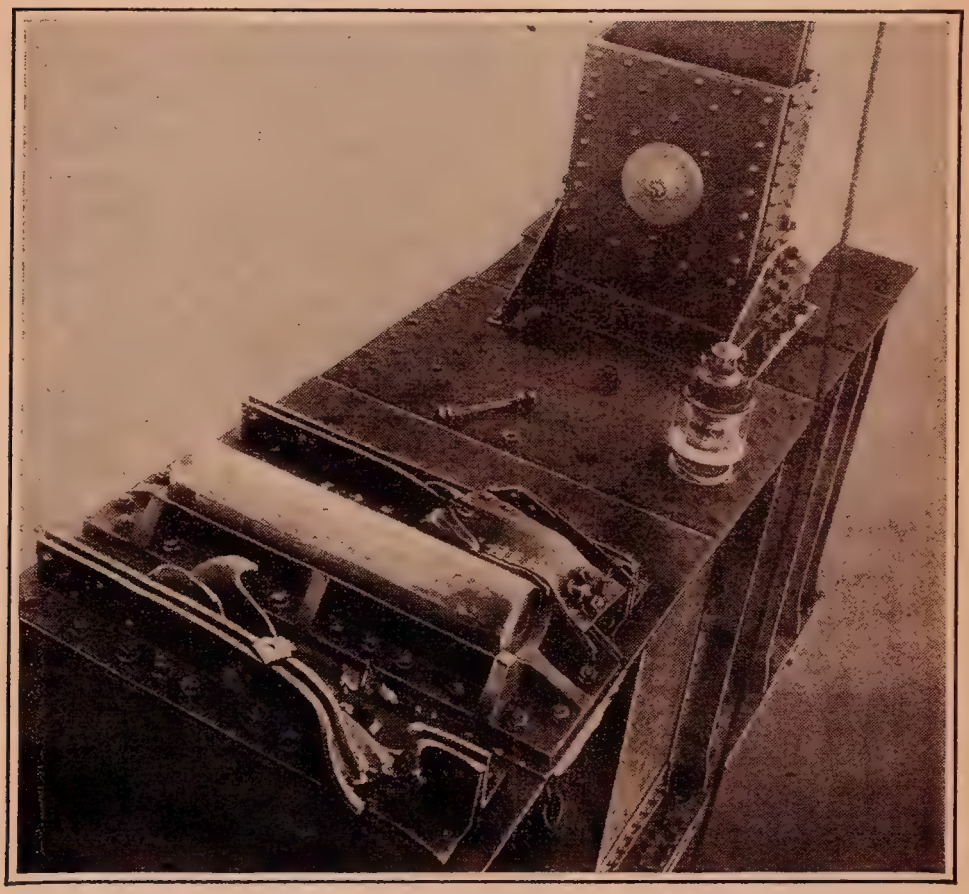
stronger than carbon steel, to keep down weight; yet it weighed a thousand tons. It was supported on four six-wheeled trucks running on double lines of rails 6 feet 6 inches apart.

It could travel back and forth at a speed of ten feet per minute, and it had quite a bit of traveling to do at that. For instance, it had to make four trips from approach span to main pier to build the anchor arm on each side of the river.

On the first trip, starting from the anchor pier at the end of the approach span, the traveler began erecting the steel false work that was to support the floor of the anchor arm during construction, and laid the floor material, extra lines of girders for the traveler track and the outside staging which supported the main trusses and bracing of the anchor arm.

This was a two months' job on the north shore. When it was completed the erection of the main shoes was begun.

Next the traveler started back for shore, laying the bottom chords on its way. On reaching the shore end of the anchor arm the traveler, true to its name, started back for the main pier, not stopping to do any work on this journey of 515 feet.



HERE IS THE OFFICIAL HISTORY OF THE LATEST DISASTER TO THE QUEBEC BRIDGE INDELIBLY CARVED IN STEEL. THESE HIEROGLYPHICS, PLAIN ENOUGH TO THE PRACTISED EYE OF THE ENGINEER, TELL HOW THIS SUPPORTING BEARING BROKE AND ALLOWED THE SIX HUNDRED THOUSAND DOLLAR SUSPENDED SPAN TO SLIP OFF AT THE SOUTHWEST CORNER AND SLIDE DOWN TO THE BOTTOM OF THE ST. LAWRENCE.

Photograph by courtesy of the Scientific American and Engineering News.

Returning thence toward shore, the web members below the middle joints—that is, the lower half of the letter k's—were placed. On the final trip from shore to main pier the upper half of the trusses was placed, which finished the anchor arm.

Where Accuracy Counted.

The erection of the main posts was the next job. Each post is composed of four separate columns latticed together in four directions terminating in a solid tapered section at top and bottom. As each post weighs 1,500 tons, it had to be divided into twenty-six sections for shipping and handling.

Here the engineers began to draw dividends on their accurate machine-work and the wonderful electric traveler with the human touch. Although the sections had to be put in place with splice plates attached to the ends and lowered with extreme precision to allow the webs and flanges of the adjoining section to be entered between the various plates and angles forming the splice, the efficiency of the electric hoists was so remarkable that the work went on with great rapidity. In four weeks from the start the two posts on the north main pier were finished and the traveler was ready to begin the cantilever arm.

The bottom chords in the cantilever arms consist of four plate girder webs latticed together. The largest is 84 inches deep and 124 inches wide. To get these bottom chords down to a size that could be handled at all each main panel was divided into two half-panel sections. Even at that some pieces weighed 160,000 pounds. Two of these were lifted and handled into position simultaneously by the traveler.

"Flying Bridge" Hastened Placing.

In order to splice these heavy masses of metal in mid-panel another ingenious device had to be provided. This was the "flying bridge," which was a steel framework the length of a full panel pin connected temporarily to the bottom of the completed part of the bridge at the inner end, while the outer end was supported by plate hangers from the upper part of the truss.

On this flying bridge the bottom chords could be assembled and jacked into position as easily as if they had been laid on the ground. Although no credit was given, the engineers probably got this idea from seeing a woman carrying her apron full of chips.

With all these ingenious facilities the work of erection proceeded smoothly and swiftly. With an average force of two hundred men, including eight gangs of riveters, the first main panel of the south cantilever arm, which was the biggest one, consisting of 3,100 tons of steel, was erected in 22½ working days.

The next panel, composed of 2,650 tons of steel, was erected in 18 working days; the third panel, 1,960 tons, in thirteen days.

Only One Loose Rivet Out of 4,000.

The entire south cantilever arm, weighing 26,000,000 pounds, was erected in 92 working days, the finishing date, July 26, 1916, being more than a month ahead of schedule time. Engineers declared that the celerity and ease with which the enormous members were put in place and fitted were "almost phenomenal."

The work was well done, too. In one section of the work, out of more than four thousand rivets in bottom chord splices, inspectors could find only one that was loose.

Not the least interesting thing about this wonderful structure is the way in which it is nearly balanced on the main piers. The construction on both sides of the river was alike, the anchor arm on each side being 515 feet long and the cantilever arm 580 feet.

But the cantilever arm contained a large percentage of nickel steel for the sake of lightness, while the anchor arm was constructed of carbon steel, which requires a much larger section to give an equal degree of strength.

Before the suspended span is swung into place there is only about one hundred tons difference in the weight of the two arms on each pier. The bridge is to be eighty-eight feet wide, providing room for two railroad tracks and two foot walks.

This suspended span was 640 feet long.

While the south cantilever arm was being erected the suspended span—the link that was to connect the two cantilever arms—was being built on shore at Sillery Cove, three miles below the bridge site. Although built of nickel steel to keep down the weight, it was designed to contain 6,000 tons of metal in its completed state, although only 5,000 tons was put together at Sillery.

When these 5,000 tons had been finally riveted into place, six scows, each 160 feet long and 32 feet wide, were run under it at 1 o'clock on the morning of September 11, while the tide was out. As the tide rose the scows lifted the span off its shore supports and in two hours and a half it was afloat. At dawn the span was swung across the river, and with two tugs pulling and five holding back, with an eighth standing by to lend a hand wherever needed, the span set out upon its three-mile voyage.

It required about an hour to maneuver the span into midstream, and about an hour and a quarter more to tow it to the bridge-site. Three hours exactly from the time it left the erection site it was connected up to the lifting hangers and was ready for lifting.

Hoisted by 8 Hydraulic Jacks.

Soon after the tide began to ebb, and at the same time the eight hydraulic jacks, each capable of lifting a thousand tons, began to hoist away. The great crowds on the river banks and on numbers of vessels on the river cheered again and again as the great span swung clear and the scows were towed from under.

Everything worked smoothly and swiftly at first until the span was some fifteen feet above the water. Then, on account of the early start and the long, hard job ahead, a stop was made for lunch.

A number of the most distinguished engineers among the invited guests of the St. Lawrence Bridge Company, who had made the voyage up the river on the suspended span and had remained aboard during the first stages of the hoist in order that they might have the best possible view of this unprecedented feat, went ashore to have a bite with the rest and did not return to the bridge, but went out in boats to watch the proceedings from the river.

5,000 Tons of Steel on River-Bottom.

It was fortunate for them that they did, for a few moments after operations had been resumed the up-river corner of the south end of the suspended span slipped from its hanger with a report like a cannon-shot. There was a succession of snapping sounds like a machine-gun volley, and then the whole five thousand tons of steel cork-screwed end first into the deepest part of the St. Lawrence. By such narrow margins is it that men escape death.

In the *post mortem* which followed hieroglyphics were found carved in the steel by the falling span that told in unmistakable language the story of the accident. The failure was due to the breaking of the temporary supporting bearing under the southwest corner of the suspended span.

This bearing was a universal joint required during the erection of the span and the process of hoisting into position. It consisted of a cast-steel shoe with a pin groove parallel to the bridge carrying a pin 9½ inches in diameter and 46½ inches long.

Another steel casting was supported on this pin which carried another pin, 8 inches in diameter and 26¾ inches long at right angles to the first. This joint allowed a little play to the immense mass of steel without endangering its structure.

A number of men went down with the

span, thirteen of them never to rise again. Half a dozen others were injured. Boats hastened to the spot and picked up a number of men.

Cantilever Arms Weather Supreme Test.

A good many of the special guests of the bridge company had taken up positions on the ends of the cantilever arms where they could have a good view of the operation of hoisting. These were all thrown violently down as the ends of the cantilever arms shot up like the monster springs they were as they were released. These big springs oscillated through a space of some eighteen inches several times before they gradually steadied down. By a miracle no one was thrown into the river.

The one consolation derived from this disaster is that the cantilever arms are at last as stanch as poor Yenser said the first ones were nine years ago, for they passed through this supreme test absolutely unharmed.

This has encouraged the government and the construction company to go ahead and make another attempt to complete the bridge. The engineers are confident that the right method was chosen, and that the bridge can be completed as originally planned. The lost span can be replaced in about a year's time at a cost of some six hundred thousand dollars.

FROGS.

Labor gets 43 per cent of railroad earnings.

The 100-car freight-train has become common.

The average capacity of a freight-car is 39 tons.

Our railroads operate more than a million box cars.

The average railroad trip for passengers is 33 miles.

The air-brake was applied to passenger-trains in 1868.

The average passenger-train carries only 56 passengers.

Car axles cost three times as much as they did before the war.

The express companies still use dog-sledges in parts of Alaska.

The B. and O. uses a million pens and twenty million pins in a year.

Railroad men and their families represent 7 per cent of our population.

War has forced some English railways to engage girls as engine cleaners.

There are over 800 independent competing railroads in Uncle Sam's land.

A train three-quarters of a mile in length recently left Detroit, carrying automobiles.

Freight-loads of 6,000 tons are commonly hauled by single locomotives of the larger type.

The average pay of all classes of railroad workers in the United States is $825 a year.

About two billion pounds of mail are being annually transported on American railroads.

In 16 years the New York Central system has spent $400,000,000 on improvements.

The block-signal system is in use on nearly a hundred thousand miles of American railroad.

It's a large world, and there are 691,000 miles of railroad in it; 260,000 miles are in America.

The Solomon of a Georgia railroad has ordered the trackhands to milk every cow found on the right-of-way.

New Jersey has the largest railroad mileage per 100 square miles of territory of any State in the Union.

The old hand-brakes required 90 per cent more time and distance to stop a train than the modern air-brakes.

Cooper's little engine, Tom Thumb, weighing but a ton, hauled four and a half tons up-grade at 15 miles an hour in 1830.

The paper shortage caused several roads to abolish waste-baskets, the discarded paper being saved and made into scratch-pads.

Four express companies, the Adams, American, Wells-Fargo, and Southern, do 95 per cent of the express business of the country.

The government-owned railroads of Canada pay no taxes and lose money; the privately owned roads pay taxes and dividends, too.

A South American road only 134 miles long carries half the world's supply of coffee to the sea and pays 14 or more per cent annually.

The non-railroading championship of the world is held by Persia, which has only 33 miles of road, or one mile for every 270,000 inhabitants.

Passenger fares in the United States range from a cent a mile in some forms of commutation tickets to five cents a mile in sparsely settled regions.

The Canadian Pacific is preparing a thousand farms for returning soldiers. Houses, barns, wells, and fences will be ready for the veterans when they get back from Europe.

UNIQUE BALTIMORE AND OHIO "BROTHERHOOD."

THE WELSH BROTHERS ARE AN EXCLUSIVE RAILROAD FRATERNITY. THE ENTIRE SEVEN ARE LIFELONG EMPLOYEES OF THE BALTIMORE AND OHIO RAILROAD, SIX AS ENGINEERS AND THE SEVENTH AS A TELEGRAPHER.

"ORDERED FOREIGN."

BY H. KEITH TRASK.

How the Oil-Burner Got Tommy in Bad at Tiflis; and How Tarnoff Proved a Prince in More Ways Than One.

HE first time Tommy Knox met Tarnoff was when Tommy was night superintendent of the locomotive works and Tarnoff had come to the plant to learn something of the business. The second time— But that, after all, is the story.

There was an air of mystery about Tarnoff. Bob Murphy, night foreman of the erecting-shop and general compendium of shop gossip, voiced the popular belief to Tommy one night as they stood together at No. 13 Track. Tarnoff had a kind of thinking part in the erecting-shop at the time. That is, he was called a track-boss—which is a cross between an errand-boy and an inspector—but he took it out chiefly in observation. He was on the day turn, and had been detained one night to watch the application of a new and complicated dingus to one of the big boss's ideas.

"They say that guy's a prince," Bob remarked, indicating Tarnoff, who stood a little apart from the activity around the dingus, cool and impersonal.

"I wouldn't be at all surprised," Tommy returned. "What corner of the world does he come from, Bob?"

"Oh, somewhere across the pond," Murphy answered, waving a vague arm. "Of course, those parts are full of princes—they're no more than members of Congress here."

Then Bob chuckled.

"He's living with 'Court' Sharpe," he added. "Wouldn't you know that Court would grab off the only live prince in captivity?"

Several nights after this conversation, Tommy ran down to the hospital to inquire about one of his men who had been injured. It was quite late, and he merely chatted a few minutes with the head night nurse, then started back, going the long way around to have a look at down-town by electric light.

In front of the City Hall he came upon an interesting group. A big policeman was in executive session with two young men in evening clothes, who had plainly been dining rather better than was wisdom.

One of them, whom Tommy instantly recognized as Courtenay de Courcey Sharpe, was leaning against the iron fence with his hands in his pockets. The other stood haughtily by, straight and stiff, albeit he occasionally wabbled sufficiently to detract from his air of extreme detachment. It was the stranger, Tarnoff.

"Now, ol' man," Tommy heard Sharpe say to the cop, who had been talking persuasively, "I c'nsider your remarks out place, 'mpert'nent, in fact—I would like to see you on your way!"

"Youse two be on your way," the cop urged firmly but good humoredly. "You'll catch cold here; where do you live?"

He took the obdurate one by the arm.

"Leggo me!" Sharpe commanded with dignity.

"Come now!"

The cop was commencing again, when Tarnoff stepped suddenly forward and

tapped him on the shoulder. The stranger's tone was cold and haughty, the tone of a man speaking to a menial, and his speech betrayed none of the unsteadiness perceptible in his legs.

"You filthy boor, how dare you touch my friend? Take your hands from him at once!"

He raised a menacing arm.

"You won't? Take that, then!"

Knox was too late to interfere. He had seen what was bound to occur and had jumped forward, but before he was within reach Tarnoff's good right had blacked the cop's eye.

His good nature a thing of the past, the officer dropped Sharpe, seized his assailant by the coat-collar, and pushed him roughly toward the patrol-box on the corner, jabbing him in the ribs with his night-stick as he went.

Sharpe, released from bondage, slumped down beside the fence and went to sleep, a placid smile on his face.

Tommy hesitated to interfere. The offense had been a flagrant one, and Tarnoff's was not a winning personality, but it suddenly struck him that, after all, these two revelers were shopmates, and that, if news of this escapade came to the big boss, it would go hard with them both.

Fumbling in his pocket, he stepped quickly forward and addressed the officer, who was having his own troubles in attempting to open the box and hold his prisoner.

"Say, officer, let me take them home; they're friends of mine."

"Look at me eye!" returned the bluecoat passionately. "It's fifty dollars or a month in the pen for this one for resisting arrest. Look at me eye!"

Tommy pressed a crackling bit of paper into the hand that was fumbling with the box.

"I know, but they don't do this kind of thing ordinarily; and you won't be hard on them!" he suggested persuasively.

"And who might you be?" the other inquired, fingering the contents of his palm with appreciation.

"You ought to know me," Knox returned with a smile. "How about those little naps in the receiving-department office, when you're on the Brook Street post?"

The officer, still holding his prisoner with a firm and wrathful hand, whirled on Tommy and scrutinized him more closely.

"Oh, it's yourself, is it, Mr. Knox? And who might your friends be?"

"Never mind that, Riordan; you'll let them go, won't you?"

"Well—" said the Law doubtfully.

He released his hold of the prisoner's collar, nevertheless.

"Get them out of my sight, then!" he broke out suddenly.

He had caught sight of the X on the bill in his hand.

Tarnoff had ceased to struggle as soon as Tommy had first addressed his captor and had stood quietly by. Now he helped Tommy to shake Sharpe into a state of semiwakefulness, and together they steered him into a nighthawk. Tommy would have followed, but Tarnoff leaned out of the cab and extended his hand.

"Good night, Mr. Knox," he said evenly. "I have to thank you for getting me out of an awkward situation. It is a curious place, this country of yours," he continued, lighting a cigarette with a hand that had recovered its steadiness. "At home that fool would have been shot to-morrow morning for his stupidity. I shall not forget your service to me, Mr. Knox. Perhaps some day I shall be able to repay in kind."

With Sharpe singing gently to himself in a key that resembled a tea-kettle coming to the boil, the cab departed.

From that time until he disappeared from the works, Tarnoff always greeted Tommy in a friendly way at their infrequent meetings. There was, however, a vague air of condescension about the man, in spite of his perfect courtesy, that invariably riled the democratic Mr. Knox. After Tarnoff's departure Tommy speedily forgot that he had ever existed.

Time passed and the spring of 1914 came around. In the middle of June Tommy found himself struggling with the Russian language and Tatar dock-laborers at the port of Rostov-on-Don, which is at the head of the Black Sea. He had been "ordered foreign" to erect and put into service a big, oil-burning Mallet pusher-engine for the Transcaspian Railway.

Tommy got his boxes and crates transferred from steamer to cars; then he and his goods trundled leisurely eastward and southward by rail, arriving in time at Baku on the Caspian shore of Caucasia—the heart of the Russian oil-fields.

The farther Tommy went, the more he appreciated that, before tackling this job, he should have taken a correspondence course in the somewhat difficult language of the country. By the time he reached Baku, he realized why an armless foreigner was apt to be silent and taciturn. He himself was talking chiefly with his arms and hands. He had also become adept in making little sketches in his note-book of everything, from a hard-boiled egg to a missing packing-box with the shipment-marks thereon.

The engine was erected in the Transcaspian shops at Baku. Tommy dealt chiefly with a gloriously whiskered official in uniform, whom he took to be the equivalent of a master mechanic and with whom he became as chummy as circumstances would permit.

The shopmen addressed this personage as "excellency," but Tommy knew him solely as "Sport." Early in their acquaintance the services of an interpreter was called in, but as the interpreter was, by nature and temperament, an artist and knew nothing of mechanical terms, Russian or English, he was found to be of less value than he might have been.

One day, when the erecting process was well advanced, Tommy's friend conveyed to him that he desired enlightenment as to the details of piping and installing the oil-burning apparatus, which was of a type new to the Transcaspian workmen. Tommy hunted for the oil-burning arrangement-card, and found that it had been overlooked by the packers in the home shop. He whipped out his handy note-book and sketched rapidly.

"See, Sport, it's this way," he elucidated with deft pencil-strokes. "This is the Mulhall burner—steam goes in here, oil here, mix here. Simple enough!"

The master mechanic studied the drawing; then he showed it to his machinist foreman, and spilled some language. The foreman's face brightened and he hurried off. Then Sport returned the book to Tommy, at the same time conveying by means of the interpreter that he hadn't caught the name of the burner.

"Mul-hall," said Tommy, slowly and distinctly.

The master still looked puzzled. Tommy took out his pencil and wrote the name on the sketch, whereupon the interpreter made sounds as if he were choking. The master mechanic nodded intelligently and, with a smile of triumph, said something that was near enough.

On her trial trips the Mallet proved very successful, but Tommy was informed that before he received his letter of acceptance and was released, the Railway Administration desired that he accompany her to Tiflis, where she would be worked as a helper, pushing oil and ore trains up the heavy grades of the Caucasus Mountains. Tommy was delighted to go. He and the engine took it by easy stages, stopping on several divisions to demonstrate to the local officials what she could do.

A regular crew had been assigned to the engine, and all Tommy had to do was exercise an oversight and keep a record of her performance. Runner and fireman were both Russian mechanics, and while Tommy got along well enough with them, he found them precious poor company; so that by the time he reached Tiflis he was hungry for just one word of his own language.

They reached their destination on a forenoon. Tommy went to the best hotel and engaged a modest suite of bedroom

and bath. He had made the last division as a passenger, not caring to arrive in a strange hotel in his war-paint.

He ate his lunch in a roof restaurant that overlooked the city with its wonderful rose-gardens. While he ate an excellent orchestra discoursed sweet strains, among them some of Sousa's music; but that was as near a home touch as Tommy got, and it made him more homesick than ever. He knew enough French to handle the waiters and the hotel-clerk; but his yearning for his mother tongue increased minute by minute. He felt that he was in this throng of brilliantly uniformed officers and handsome women, but as far separated from them as the poles. He also wondered somewhat at the feverish excitement that seemed to pervade every group.

During the afternoon time hung heavy on his hands. He was to take the engine up the mountain that night, but he had the hours to put in until ten o'clock, so he decided to have a look at the town, and went forth afoot.

Tiflis is a strange old city, presenting startling contrasts of the ancient barbaric and the newly civilized. Tommy had a look at the opera-house and all the public buildings, poked his nose down a street into the native quarter, then wandered up the hillside toward the residential part of the town. Here he passed along a wide avenue bordered by high walls. Occasionally he could get a glimpse through a gate of the gardens within and the stately mansions.

He finally reached the heights above the city, where he came to what he took to be a fortress. He wondered whether he could go inside and made up his mind to try it—they could do no more than throw him out. An open gateway invited him; Tommy walked in, passing a sleepy sentinel nodding in his striped sentry-box at the gateway.

As a spectacle Tommy considered that the fortress itself was not very interesting, but he obtained a wonderful view from the ramparts. He also became mildly interested in the mechanical details of a gun-carriage. He knew something of modern gun-carriages, for the locomotive works had, in a moment of madness, undertaken to build some, and Tommy had been one of the chosen to carry the burden of worry.

Once or twice as he progressed Tommy noticed a man in inconspicuous clothes who seemed to be following him about. He concluded that the man was another sightseer, and wished that the other would give him a chance to open a conversation. At a moment when the man was leaning over the parapet, apparently immersed in the view, Tommy even started to retrace his steps, but the other retreated hastily and disappeared. After that Tommy saw him no more.

Dinner was as lonely a meal as luncheon had been. The roof-garden was crowded with officers, ladies, and civilians, all talking excitedly in the alien tongue. As Tommy looked about him his face took on a very wistful expression.

He had finished his dessert, lighted a cigarette, and was waiting for his change when he noticed a party of three at an adjacent table who seemed to be watching him interestedly. The man of the party was elderly and distinguished looking, and dressed in a uniform that denoted high rank. His wife was as distinguished in appearance as he, and as for his daughter —I give you Tommy's assurance that she was "some looker!"

When she saw Tommy looking at them, the elder woman smiled at him. Yes, there could be no mistake! She actually smiled at Tommy Knox and gave him a little friendly nod! The girl, too, nodded.

Tommy was extremely embarrassed and the red flushed his cheeks. Evidently they had mistaken him for some one else; but he bowed in a stiff, shy way and hurried to the elevator.

He went to his room with a warm glow suffusing him at the encounter. It had been a mistake, he was sure; but in his lonely state that robbed the incident of none of its pleasure for him. He changed

to his working-clothes, then started for the engine-house, pausing at the desk to leave his key, American fashion.

The elegant clerk scrutinized his rough clothes with a surprised air, then smiled in a knowing way, remarking in French:

"*Monsieur* is about to undertake some adventure of gallantry, doubtless?"

"Of a certainty, *monsieur*," Tommy returned in his best school French. "That is, if *monsieur* is pleased to call it an adventure of gallantry to shove a string of tanks up the hill."

This last he said in English, not being up to translating railroad slang into French.

The clerk looked mystified, but smiled again, as if he thoroughly appreciated Tommy's finesse in avoiding an awkward question.

As he turned away from the desk Tommy came face to face with his friend of the fortress. He took Tommy's place at the desk and spoke to the clerk in rapid Russian.

The Mallet performed most satisfactorily on the hill that night. Being an oil-burner she was a clean engine, so that when Tommy returned in the early morning he showed no traces of the night's labor, aside from his old suit and soft shirt. The same clerk gave him his key and, although he forebore to make any further comment, Tommy noticed that he scrutinized him very carefully. Arrived in his room Tommy sent his best suit to be pressed; then went to bed, comfortable if not particularly happy.

Some indefinite time later he was awakened by a noise in his room. He sat up quickly; as he did so the latch of the outer door slipped into place with a soft *click*. Somebody had been in the room. Then he saw his clothes lying on a chair, neatly folded, and concluded that it was the valet who had been the intruder. He looked at his watch, found that it was after midday, decided that he had slept long enough, and hopped out of bed.

On the way to his bath he stopped dead in the center of the room. His belongings were few, but what there were of them he had carefully placed in the bureau drawers. Now they were scattered over the floor, as if the room had been ransacked in haste by a careless hand. An inventory failed to reveal anything missing.

Yes, there was, too—the sign-language note-book was gone! Then he laughed to think how a Russian burglar must have cursed at finding no booty. Tommy considered the advisability of reporting the occurrence to the management, but abandoned the idea. It would be too much trouble to make himself understood; and he had lost nothing, anyway. He had probably dropped the note-book on the engine.

The excitement in the streets was increased that afternoon. People gathered in groups at the corners or in the cafés, and as they sipped their drinks they seemed to be discussing something of great moment. Officers dashed by in motor-cars, and once Tommy stood on the curb and watched a seemingly endless column of soldiers march by.

He had not seen a newspaper that he could read, or spoken, save in parables, with a single person in almost three months, so all this activity was incomprehensible to him. He wished mightily that it had been given him to understand the newspapers that people bought so eagerly. He prepared for dinner, more homesick than ever, and wishing he were back with all his heart.

Tommy looked about as he entered the dining-room, half hoping that he would see the party of the night before and that they would bow again. Yes, there they were and—wonder of wonders—the man was unmistakably making signs for him to join them.

Tommy obeyed, determined to be honest and set them right about their mistake. As he neared the table the man rose, and before Tommy had a chance to explain, was shaking hands with him and speaking in excellent English. It was sweet music indeed to Tommy's ears.

"I am General Gregoroff, Mr.—"

He looked inquiringly at Tommy.

"Knox," Tommy supplied.

"Permit me to present you to Mme. Gregoroff, Mr. Knox, and to *mademoiselle,* our daughter. We hope that you will dine with us."

Tommy managed to gather his wits enough to acknowledge the presentation, and took his seat with the Gregoroff party, his head in a whirl.

"You are doubtless somewhat surprised, Mr. Knox," Mme. Gregoroff remarked with her kindly smile, "that we should have summoned you in this way; but the truth is that last night, when I saw you looking around the dining-room, I said to my husband:

"'That nice-looking boy is an American and he is terribly homesick. Go get him and we shall talk in English to him for the sake of our own boy who is in America.' But before my Ivan could rise, you had left the room, and we did not see you in the lounge afterward."

Such a simple, kindly thought from these people, who were undoubtedly of great importance, brought a lump into Tommy's throat. His embarrassment wore away quickly, however, and he soon unburdened himself of all his trials and tribulations since coming to Russia.

The eager interest of Mme. Gregoroff and her daughter drew from him also a complete account of his work. Their Michael was in a steel-works in Pittsburg; perhaps Mr. Knox had met him? Mr. Knox had not had the pleasure, but he could describe Pittsburgh and the steel-works; and did so.

The talk was constantly interrupted by people who paused by the table to greet General Gregoroff with the greatest deference and say a few words to him, then hurry away to make place for some one else. By now Tommy had discovered the Russian word for "highness," and he found that everybody so addressed the Gregoroffs.

When they rose, Mme. Gregoroff said to Tommy:

"I hope, Mr. Knox, that you can spend an hour with us in the lounge to tell us more of Pittsburgh. The general is to be very busy, and will call for us later. Poor dear, his is a great responsibility, now that war has been declared!"

"War!" Tommy exclaimed in amazement.

"How stupid of me!" Mme. Gregoroff returned. "I had forgotten that you had heard no news. War has just been declared between Russia and the Central Powers. Heaven knows where it will end!"

She rapidly related all that had happened in those tragic days of June and July. As she finished, the general came up; his face was very grave. He said a few words to his wife in Russian, and both she and her daughter cried out. Then he turned to Tommy.

"We have been ordered to mobolize at last. I leave Tiflis within the hour, Mr. Knox. It is my hope that, in some happier days, I shall get to know you better."

He shook hands with Tommy, embraced his wife and daughter, and hurried away.

Mme. Gregoroff watched him until he disappeared, then turned to her daughter. Tears stood in her eyes.

"Tatiana, take Mr. Knox on the terrace for a few minutes," she suggested.

Tommy, seeing the trouble in the girl's face, protested and would have left them but Mlle. Gregoroff willed otherwise.

They went out on the terrace and walked up and down in silence. Embarrassment had again overwhelmed Tommy, but this time it was the embarrassment of sympathy.

He wanted to say something to this beautiful girl, and he didn't know what to say. He realized that her interest in him was only that which had prompted her mother to send for him, and that he might readily be impertinent.

Tatiana Gregoroff was his junior by several years, but there was that about her which showed him that in knowledge of the world she was his senior by ages.

There was in her manner a mingling of friendliness and condescension that reminded him of somebody whom he had known in the past, but could not now recall.

They had made but a few turns when a man came out of the hotel and addressed the girl with the utmost humility.

"Speak English," she directed sharply in that tongue. "This gentleman knows no Russian."

"But, your highness," the man—whom Tommy recognized as his friend of the fort—protested in English; then lapsed into Russian.

"Speak English, I say!" Mlle. Gregoroff insisted angrily.

The man shrugged his shoulders, as if despairing of argument with her, set a silver whistle to his lips, and blew a short call.

Instantly the terrace swarmed with soldiers. They set upon the thunderstruck Tommy, bound his hands, and roughly dragged him toward a motor-car standing in the drive. As they shoved him into the car, he looked back and saw Mlle. Gregoroff still talking to the man of the fort.

She was storming at him, and he was fairly groveling before her. But that didn't help Tommy Knox much, for, with a soldier on either side of him and two in front, he was driven rapidly through the streets and up to a forbidding-looking doorway.

Here he was ordered to descend, was taken before an officer, searched, and sequestered in a cell without being given a chance to speak or told why he had been arrested.

The hours passed. Daylight finally showed through the high, barred window of Tommy's cell. A soldier brought him some breakfast, for which he had no appetite. Then he was left to himself again for more weary, anxious hours.

When it seemed that he must go mad under the strain of suspense, the door was flung open, two soldiers led him forth, and he walked through interminable stone-walled passages into a room where sat an elderly, evil-faced man in Cossack uniform, attended by several officers. Tommy was placed before the desk with a guard around him.

Slowly his numbed brain registered the impression that some one was speaking. It was the man of the fort. His accuser spoke at length, frequently pointing to the prisoner.

At one point he produced a portfolio, which he handed to the elderly man, who examined the contents carefully, then passed them to his colleagues. As they went from hand to hand Tommy tried to see what they were, for everybody evidently attached much importance to them, but he was unable to obtain even a glimpse.

In the end the presiding officer arose, his fierce, dark face set in a scowl. He addressed Tommy, one of the minor officers interpreting:

"Prisoner, you are accused of being a spy. The evidence is conclusive. You are sentenced to be shot to-morrow at sunrise."

That was all.

"But—I don't understand! What is the evidence? Am I not to be heard?" poor Tommy protested.

"This is war," the interpreter answered shortly. "His excellency has no time to waste on spies!"

Back in his cell, Tommy racked his brains for the cause of his arrest and condemnation. Naturally he connected it with his visit to the fort, for it was the man of the fort who had been his accuser.

But why hadn't they fired him out if he was trespassing on forbidden ground? The sentry had let him pass, and the other man could have had him ejected at any time.

All the dark stories he had ever read of the Russian secret service came back to him. He would demand to see the American consul. He tried to make the guard understand what he wanted, but in vain; a shrug was his only answer.

They brought him a supper which he left untasted. After years of mental torture he looked at his watch, and found it was only ten o'clock.

Then he wound it mechanically. As he did so the chilling realization came to him that never again would he wind a watch!

All too quickly the night passed. Faint streaks of dawn were showing in the eastern sky when Tommy was again led to the waiting motor-car. They were very prompt; he would be shot on schedule time, no doubt of that!

The motor passed swiftly through the streets and commenced to ascend the hill. They were going to shoot him up on the heights, then. He was glad; he would rather die up there near the sky; and he was going to show them how an American can meet death.

He squared his shoulders and raised his head proudly. How beautiful were the gardens through which they were passing! He had missed these gardens on his unlucky excursion.

The eastern sky was flaming now; his time was very short. Queer for them to bring him to a place like this to shoot him! The car stopped before an imposing building. Why, this was the palace of the governor-general!

Surrounded by his guard, Tommy walked across an entrance-hall crowded with officers, who looked at him curiously as he passed. He stared straight ahead; he would show them he was not afraid.

The guard halted at a door guarded by two Cossack sentries, and the officer stepped inside. He returned quickly and led Tommy into a room blazing with electric light, although the sun had now risen.

It was a huge room, but the center was completely filled by a table, upon which rested an enormous map. A young man in a simple green uniform, who was seated at the far side of the table, looked up at Tommy's entrance, a pair of dividers poised in his hand. He stared at Tommy long and intently. Tommy met the stare, unflinching.

"So this is the accused!" he said to the officer at length. "Have you the papers upon which the accusation is based?"

When he spoke an odd flash of memory tortured Tommy. Where had he heard that voice before?

With a low bow the officer presented the mysterious portfolio. While the young man examined the papers with an impassive face Tommy watched him narrowly, seeking some sign of hope for himself. At last the young man looked up and addressed him.

"This is a very serious crime of which you are accused," he said in perfect English. "These papers are most incriminating. What have you to say in your defense?"

It almost seemed that the shadow of a smile crossed his face, but that, of course, must have been imagination.

Tommy stood on the opposite side of the desk with folded arms.

"I don't know why I was accused, sir," he answered, "or what the papers may be. I certainly had none."

The other turned to his aides and spoke a word of Russian, whereupon they and the officer of the guard bowed low and left the room, and Tommy was alone with his judge, who stared at him thoughtfully.

"You have had a very narrow escape," he remarked, shuffling the papers before him. "Had my aunt and Tatiana not made your acquaintance, nothing would have saved you; as it was, I returned to the city barely in time!"

He continued to turn the papers over slowly, pausing now and then to scrutinize one; and now there was a real smile on his face. At length he came to a page which he examined minutely; then he addressed Tommy again.

"So this is the Mulhall burner of which I have heard so much! Tell me, Knox, do you consider it superior to the one the works was applying when I was there?"

"Tarnoff!" Tommy gasped, his eyes wide with amazement and relief.

For an instant Tarnoff's face took on the old haughty, detached look, and he stiffened; then he laughed outright and pointed to a chair.

"Yes, Tarnoff, if you will. Sit down, Knox!"

"But what are you doing here?" Tommy persisted.

"When I was in your country my ambition was to become head of our imperial railway system," Tarnoff answered. "But fate and our great Czar willed otherwise; so I am here. In other circumstances, Knox, you should be my guest for a time and we should 'railroad,' as you say. Now I must turn you over to the Princess Gregoroff and Tatiana. You shall be their guest as long as you care to stay in Tiflis."

He held the page of Tommy's notebook so that Tommy could see it.

"Really, Knox, you can hardly blame our worthy governor of the city. That thing looks like the plan of a fortress, or perhaps a butterfly—to say nothing of the other works of art I see here. I shall keep them, with your permission, as a souvenir."

He rose and held out his hand.

"Good-by, Knox. I trust I have repaid that little favor in front of the City Hall!"

As he whirled away in the motor, Tommy turned to his late guard-officer, who now disclosed an hitherto unsuspected gift of tongues.

"Who is it to whom I am indebted for my life?"

"It is his royal highness the Grand Duke Piotr Petrovitch, governor-general of Caucasia," his escort informed him solemnly.

THE SEMAPHORES.

BY MAX J. HERZBERG.

THAT sudden mightiness, whose form
Snakelike o'er heaven can creep;
And huger than the hurtling storm,
In white volcanoes leap—

Him has man tangled in his wires,
And cabined in his lamps,
And man has chained his crackling fires,
And bound his strength with clamps.

A glow of green, a blaze of red,
An arm across the rails,
The sign that danger lurks ahead
On the far-dwindling trails.

A blaze of red, a glow of green—
The train's long thunders roll.
Hist! How it splutters forth its spleen,
That curbed electric soul!

JUST LIKE FINDING MONEY.

Salvage Department Saves the Railroad Millions by Marketing Trash That Used to Be Thrown Away.

"DON'T throw anything away!"

That's the rule now on all the great railroads of the country.

It backs up the ancient principle that "a dollar saved is a dollar earned."

It is one of the reasons why the railroads, during the fiscal year just passed, increased net operating revenue by $308,000,000, almost a million dollars every business day.

The railroads have learned scientific economy, and are profiting therefrom.

The salvage department has become a highly important factor in administration.

D. and R. G. Got $270,000 for Its Scrap.

Out of its scrap, the Denver and Rio Grande Railroad made $270,000 in one year. The employees were made to understand that everything of value not in use was to be sold.

It was amazing the number and variety of articles that were found to have a market value. Heretofore much of this scrap was forgotten, and allowed to rust and decay.

A lot of railroad hustling is required to earn $270,000 net profit, and when that amount is just picked up it is a feat worthy of notice.

In former years salvage-work was carried on mainly by the purchasing-department. It was not the prime interest, and, therefore, not seriously considered. Now it is the chief interest of a department, and is well done.

Every employee of a railroad may be working for the success of the salvage department. Scrap paper thrown away heretofore is now kept and baled, and sells for upward of $5 a ton. It is wonderful how quickly a hundred tons of waste paper will accumulate on a heavy passenger-traffic division, especially where commuters are hauled.

Any road which is making its babbitt metal need not throw away the babbitt dross. The Denver and Rio Grande got $84 for some 1,400 pounds of dross that, before the salvage department became effective, was habitually discarded.

Some items that are commonly picked up on railroad lines and may be sold in the market for good prices are: Automobile tires, worth 10 cents a pound; inner tubes, worth from 15 to 30 cents a pound; wrought-iron pipe, worth $30 a ton; cotton out of old seats, worth 7 cents a pound; old ties, worth 15 cents apiece; leaky hose, worth from 3 to 7 cents a pound; iron scrap, now at the highest prices; and hundreds of other articles of no use to the railroad but valuable somewhere in the market.

Good Prices for Discarded Machinery.

Especially is the salvage department valuable in selling machinery which may have its uses elsewhere, but is out of date in the railroad work. Whereas heretofore such machinery has gone to the scrap-heap, it is now sold as machinery.

There are numerous instances wherein machinery that has served its purpose for the railroad has been sold for other purposes at prices close to the original cost. The scrapping of valuable machinery, wire, and tubing on railroads for many years has been a sheer waste of good material.

If money saved is money earned, the salvage department is a better revenue producer than many a railroad department with a higher-sounding title.

PRESIDENT'S WAITING-ROOM.

Whole East Wing of Union Station, Washington, Set Aside for Use of the Nation's Chief Executive.

BY ALAN JAMES.

IN order to prevent a possible repetition of the Garfield tragedy, the architects who designed the Union Station in Washington were instructed by the railroads erecting the building to include a separate room, with a private entrance, for the use of the President of the United States whenever he desired to leave Washington or was returning to the capital.

When the plans of the station were drawn up it was found more feasible to set aside the entire end of the east wing for the President's use, constructing here a whole suite of rooms for the convenience of the chief executive and his parties. Washington therefore has the distinction of possessing the only President's waiting-room in the country.

The average visitor to the capital, in inspecting the Union Station, never discovers what is behind the heavy doors which, surmounted by the coat of arms of the President, form the entrance to the the chief magistrate's private suite. Save when the President leaves Washington or is expected to return, these doors are never opened.

During the present administration the suite has been used on an average of less than once a month. Traveling was one of President Taft's favorite diversions, and there were times when he occupied this official waiting-room as often as once every three or four days.

Could the visitor penetrate behind the heavy doors which guard the private entrance to this portion of the Union Station, he would find a trio of completely furnished rooms, swept, dusted, and ready for the immediate occupancy of the

HEAVY DOORS, SURMOUNTED BY THE COAT-OF-ARMS OF THE PRESIDENT FORM THE ENTRANCE TO THE SUITE.

From a photograph by Harris & Ewing, Washington, D. C.

Presidential party; for Washington never knows when the chief executive may have to leave on a flying trip, or possibly "the first lady of the land" might desire to go shopping in New York or Philadelphia. Barring guests, the President's wife is the only person outside the chief executive himself who is allowed to make use of this suite.

Decorated in Blue and Gold.

The central and largest room of the three is a long, spacious chamber extending nearly the entire width of the station. It is paved with marble tiles and decorated in French blue and gold, long panels of the blue with gold bordering extending almost to the domed ceiling.

The room is lighted in the daytime by four large French windows, surmounted by semicircular sky-lights, and at night by a series of frosted-glass electric lamps attached to the walls and by four handsome chandeliers.

Each of the lamps, as well as each of the chandeliers, has its separate switch, operated from a private switchboard independent of the remainder of the station, and it is therefore possible either to flood the room with light or to illumine only a portion of it.

The separate lamps on the walls are mounted on heavy gilded supports in the shape of eagles' wings, with a heavy pendant of gilded bronze. The chandeliers are also massive in construction, but, being close to the ceiling, do not give the effect of crowding the room.

Furniture Harmonizes with Surroundings.

In furnishing this section of the President's suite, the designers of the station suggested a dark-brown wicker set of furniture, with Spanish brown leather cushions. This, it was stated, would best harmonize with the surroundings, and when the set was installed it was found that it was precisely what the room needed to give it a comfortable, hospitable appearance.

Chairs in plenty have been provided for the accommodation of the President's party, and two long sofas and a tête-à-tête chair near the farther door complete the furnishings.

Opening off this main room, toward the front of the station, are two smaller private reception-rooms, designed in case the President should wish to secure even greater privacy or to retire from the main portion of his party. Each of these rooms is provided with a toilet and a comfortable sofa on which the President might rest if fatigued or indisposed.

An unusual feature of the two smaller rooms is a telephone connected directly with the White House switchboard. Strict orders have been issued that no one but the President or a member of his immediate party is to use these wires.

The small retiring-rooms, like the main reception-chamber, are furnished in the dark-brown wicker and present a most homelike appearance, being much less imposing than the large salon.

Semi-Secret Passage for Sleuths.

A feature of the suite which might well be missed, even by a visitor intent upon seeing everything in the President's portion of the station, is a semi-secret passage constructed behind the west wall of the suite and running the entire length of the main reception-room.

Entrance to this passageway is obtained by half-concealed doors near the front and back of the suite, and the passage itself is intended for the use of the Secret-Service men who invariably accompany the President, not only when he leaves Washington but whenever he steps out of the White House.

By the simple expedient of stationing a Secret-Service operative at either end of this passageway, close watch can be kept upon every person entering the suite —for the doors are usually kept open whenever the President is using his waiting-room—and the operative would be in a position to stop any one who did not have a right to enter, without intruding upon the chief executive.

THE CENTRAL AND LARGEST ROOM OF THE THREE IS A LONG, SPACIOUS CHAMBER EXTENDING NEARLY THE ENTIRE WIDTH OF THE STATION. IT IS PAVED WITH MARBLE TILES AND DECORATED IN FRENCH BLUE AND GOLD.

From a photograph by Harris & Ewing, Washington, D. C.

The switchboard which operates the lights in the suite is also situated in this passageway, and it is therefore impossible for any one to plunge the place into darkness, under the cover of which an attack upon the President might be attempted.

This passageway has never been used during President Wilson's term of office, as the present President dislikes the constant supervision of the Secret-Service operatives, but prefers, as they have to be continually on guard, that they stay near him.

During President Taft's administration, however, the passageway was quite frequently tenanted, as Mr. Taft was in the habit of spending a half-hour or more in the main reception-room, either before leaving Washington or when returning to the capital.

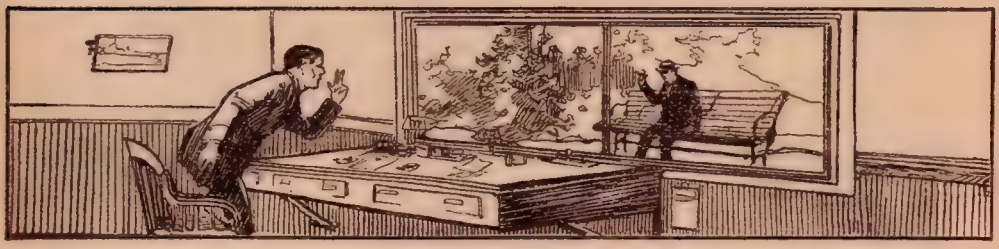
At the far end of the reception-salon, when one enters from the street, are two heavy doors, similar to the ones at the entrance to the suite, leading to the train-shed. Beyond this point there is no dividing-line between the President's territory and that of the ordinary traveler, save that four large bronze rings are set in the walls of the open space leading to the train-gates, and from these rings are suspended ropes to form a passageway for the chief executive from his waiting-room to the gate where he is to take his train.

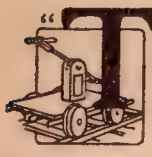
The ropes are not usually put up when the President leaves Washington on an ordinary trip, but are used principally at inauguration time or when there is an exceptionally large crowd in the station. With these ropes, augmented by a cordon of police and Secret-Service operatives, it is an easy matter to keep the crowd back and preclude the possibility of an attack upon the President's life such as occurred when Garfield was assassinated.

THE TALKING TELEGRAPH.

BY FRANK KAVANAUGH.

Only Ransford's Quickness of Mind Saved the Crack Transcontinental Limited from Horrible Catastrophe.





"THEY'RE putting in telephones at every way-station now," said the boomer operator as he came into the switch-shanty and sat down. "'Twon't be long until we poor ops will be digging ditches or carrying the hod. What are they good for, anyhow?"

"They're a good help to a despatcher," said the engineer, who was eating his lunch by the stove. "I'm not going into the merits and demerits of the things, but if you wish I will tell you a story of where they helped. Had it not been for a phone—an unused one, at that—my wife would be a widow now and my kids orphans, and Ransford's wife and baby—Well, wait and I'll tell it to you.

"You know where the old despatchers' office at Raytown used to be—just across the tracks from a little park where school-children played in the summer, and where the flowers and shrubs were put under glass in the winter? It was a lonesome spot at night when the other workers in the building were gone.

"Sometimes a switch engine had business down there, but mostly the tracks, with the exception of the main, were used for storage purposes. The north-bound trains got their orders at "CW" tower, and the south-bound at the yard-office, half a mile above the despatchers' office.

"Ransford, the despatcher, looked up from his work one day and glanced across the tracks to the park. As he looked his face darkened. On a bench at the edge of the park and near the railroad tracks sat a man who had all the earmarks of a ne'er-do-well. His derby was battered, and he wore no collar.

"Ransford had seen thousands of this type before, but this one irritated him, for he looked intently at the windows of the despatchers' office. Once in a while he would blink his eyes rapidly. And for four days he had occupied the same position from four o'clock in the afternoon, when Ransford came on duty, until dusk hid him.

"'If I were a fugitive from justice, now,' the despatcher thought, 'I'd think he was watching me, but it can't be. I've put in my ten years of service right here, and I know every one in town and every one knows me.'

"'Jones,' he said, turning to his opera-

tor, 'have you noticed that man out there? His eternal staring and the way he blinks his eyes gets my goat. I've half a notion to ask the police to have him move.'

"Jones looked up from his train-sheet languidly.

"'I hadn't noticed him,' he said with an assumption of carelessness. 'And I don't imagine the police would make him move if you asked them. You see, that park's public property, and he has a right to sit there, as long as he doesn't molest any one.

"'And in this man's town there's no law against looking at a tumble-down train-despatchers' office. If he'd look at a pretty woman—well, he'd be pinched for mashing.'

"Ransford turned to his work without replying. Jones had told the truth, he realized, but he did not like the tone of his subordinate's voice. Yet he couldn't well get angry at the young fellow, and, after all, Jones was a good operator. He had come to the despatchers' office in less than a year's service with the road, and the L. and G. didn't promote men for the sake of a pull or anything like that, so he must have earned the set-up.

"The sharp 'DS' call of the line south took Ransford's mind off both the man in the park and his operator, and he listened. A train-load of silk, a shipment from across the seas and worth a million dollars, was ready to be delivered to the L. and G., and the despatcher's attention was called to the fact that it must be handled over the division without delay, and on passenger time. As the sounder ceased the despatcher looked over the operator's shoulder at the train-sheet.

"'Wonder how No. 1 will be into Eagleton?' he asked.

"Eagleton was the end of the L. and G., where the train of silk would take the rails of his district, and No. 1 was the transcontinental limited and the pet of the three railway systems which handled it from coast to coast.

"'Eagleton told me a few minutes ago that No. 1 would follow the silk-train,' Jones answered. 'I think they've been running the silk-train as first No. 1 and the passenger as the second section.'

"'Then I think I'll run them the same way,' the despatcher observed. 'Who'll catch the silk-train out?'

"'Craig on the front end and Miller behind.'"

"Were you that Craig?" interrupted the boomer op.

"I was the guy," grinned the engineer who was telling the story. "Well, with that Ransford turned away with the remark:

"'Craig will make the time, all right.'

"Then he turned to the operator with a smile.

"'My wife's coming in on No. 1, and I am as nervous as a woman about her. Our baby is with her. It's four months old to-morrow, and I haven't seen it for two weeks. Funny how a man 'll learn to love a tiny, helpless bit of humanity like that, isn't it?'

"'Don't know — never been married,' replied Jones shortly.

"Ransford walked into a side-room for a drink of water, leaving the door ajar. When he returned he found the operator at the window, looking out at the park. As he drew near enough to the window to see the park, the man sitting there smiled and waved his hand. The operator, hearing the chief approaching, left the window and resumed his seat. The man in the park walked away.

"'That fellow's leaving,' remarked Ransford in a casual tone, walking to the window.

"He saw the operator start.

"'I—I— Oh, yes,' he said. 'Probably got tired watching us. The two ones are ready to leave Eagleton,' he added, as he answered a call and listened to the clatter of the sounder.

"Ransford was already writing an order. 'Give them this,' he said, pushing the order-book over to the operator:

"No. 1 will run thirty minutes late, Eagleton to Ferriday.

"'You mean first No. 1, don't you?' asked the operator.

"'No; I'm going to run the silk-train extra until I see whether Craig can make passenger time with her. Then, if he can, I may run him as a second section.'

"'But—'

"'Send it!' said Ransford.

"While he did not mind the operator differing from him on outside questions, his tone showed that he was a superior officer while in the office. And besides that, he had a vague suspicion in his mind. He would have liked to know the connection between the man in the park and the operator. He felt there was some connection between them.

"'When you have Miller's consist,' Ransford continued, 'give him this:

> "'Extra East Eng. 4406 will run extra, Eagleton to Ferriday, avoiding regular trains.'

"Then Ransford opened the key to the local wire and sent a message of his own:

> "MRS. RANSFORD, care Condr. No 1:
> "Be sure and be on observation platform when you pass Summit Siding. Fine view. Want to see you and little Mary more than anything on earth.

"In the cab of No. 4406 I watched the semaphores fall behind No. 1 just as we were about to enter every block. Darkness began to fall, and on a level, straight piece of track I could see the markers of No. 1 plainly.

"'We're keeping our nose right up to the observation platform of No. 1,' I laughed down at the fireman, as he looked up once to see where the water was. 'If things hold out, I'm going to try and get ahead of her at Ferriday. She'll stop for lunch there.'

"The fireman grinned up at me and thrust his scoop into the coal in the tender. I looked back, and watched the tail-light follow my thirty cars around a curve.

"'Good old girl!' I said as I patted the reverse lever. 'We'll show 'em we can trundle this drag through in record time.'

"Up in the office, Ransford was watching the train-sheet closely. At every 'OS' station we were just five minutes behind No. 1—as close as we dare run. Sometimes we 'fudged' a little, but the operators gave us the benefit of the doubt.

"Not one of them knew we were pulling a fortune over the road, as the fact that the silk was coming had been kept quiet. Only the officials were supposed to know of the shipment.

"'My head aches,' said Jones to Ransford. 'Would you mind if I stepped over to a drug-store and got some headache tablets?'

"'Not at all,' replied Ransford. 'I'll work things until you get back, Jones.'

"Jones left his seat, and the despatcher took his place at the desk. Through the window he watched his assistant cross the tracks and disappear in the direction of the lighted street.

"Half an hour later Jones returned and sat down in his accustomed seat without saying a word.

"'Did you see that fellow who sat in the park, Jones?' asked Ransford.

"'No; he left there before dark,' said the operator. 'He's probably hunting a bunk in the city jail by this time.'

"'The silk-train's pushing No. 1,' said Jones, a few minutes later, when both trains were OS-ed from a telegraph office. 'Why not put the freight in front? Craig will keep out of the way, all right.'

"'Let them go as they are for the present,' said Ransford.

"Just then something moving in the dark outside attracted Ransford's attention. He turned and looked, but could distinguish nothing in the darkness. As he turned back, Jones, leaning forward, threw the contents of a vial in his face. Consciousness left him.

"When he recovered he was in the battery room adjoining the despatcher's office. His head ached and his eyes hurt. He could plainly hear the clatter of the instruments in the other room. Even as his senses gathered themselves, he heard Jones sending an order. It read:

"No. 1, Engine 144, will hold main line and allow Extra East Engine 4406 to pass at Summit Siding.

"Then, as his brain grew clearer, he heard another order, sent this time to the freight:

"No. 1, Engine 144, will take siding and allow Extra East Engine 4406 to pass at Summit Siding.

"For some minutes he did not grasp the significance of the two orders. But when he did, his hair began to raise. Summit Switch, he knew, was hidden by a sharp curve from view to trains coming east.

"The extra, knowing that the passenger would take siding, would be running full speed, while the passenger-train, safe in the knowledge that the freight would take the siding, would pull down to the east end of the siding and wait. The result would be that the freight-engine would tear its way through the rear end of the passenger-train.

"And all at once Ransford remembered that he had sent the telegram to his wife, asking her to be on the rear platform when the train reached that point, so that she could admire the view of a cañon by moonlight!

"For a second he went crazy. He pounded on the door and cursed Jones, whom he now knew to be in league with a gang of thieves. They had plotted to rob the silk-train, and their chosen point was one of the loneliest places on the division. Ransford's calls and beatings on the door brought forth no response.

"The switchboard of the office was in the despatchers' office. He might disconnect the batteries, but that would not recall the 'lap' orders given. Groping away from the door to the rear end of the battery-room, Ransford stumbled over an old telephone instrument.

"Once it had been used to connect the despatchers' office with the roundhouse, but had been discarded when the telegraph office at 'CW' tower had been established, as the tower was adjacent to the roundhouse foreman's office. The line-wires had long since been taken down.

"Ransford set his wits to work. By feeling the battery-connections, he at length found what he knew to be the connection of a local line which ran to the end of a spur, where it was used by a coal-mine. This being a short line, the despatcher found it by finding the line connected to the least amount of battery jars. Disconnecting a wire from one jar, he tapped it on the binding-post and sent the call out to the mine.

"'CO, CO, CO,' he called.

"Then he listened to find out whether the operator in the office heard it. But Jones, probably busy with the other instruments, paid no attention to the click of the relay of the branch line. Business with them was over for the day, anyway.

"To find out whether any one replied, Ransford, after a few calls, held the two pieces of wire to the binding-posts of the telephone. A slight tap of the bell told him some one was trying to answer him. Again he clicked the wires together and sent a message to the operator-bookkeeper at the mine.

"'Try and connect this line with your city telephone line,' he clicked the message. 'Case of life and death. Hurry.'

"Then he put the ends of the wires into the binding-posts of the telephone and listened in. He was not at all certain that his plan would work, but it was his only chance.

"It seemed an hour, but it was but a few minutes, when a very faint 'Hello!' reached his ears. He spoke low and rapidly:

"'This is Ransford, L. and G. train-despatcher. I'm locked in the battery-room at the office. My assistant is going to put two trains together so that his gang can rob them. Send a force of men to the office on the run.'

"A mumbling sound was his only reply. He sat and suffered as he thought of the big 4406 crashing into the hind end of the passenger-train. And his wife and

baby would be on the observation platform, railed in for safety and hard to get off of!

" Hours seemed to pass. Then a clatter woke the stillness of the night—that familiar clatter of the patrol-wagon. Jones, too, heard the sound and looked out the window. Then he ran through the back door, and was not caught for several days.

" His partner, the man with the blinky eyes, proved to be a half-witted operator, a dope-fiend, who had acted as go-between for the gang outside and the operator. They had kept in touch by signaling with their eyes, as suspicion would have been directed to Jones had he been caught talking with the hobo. The gang at Summit, also, was rounded up.

" With my orders in the clip before me, a good fireman, a clear night and a big engine, I was within four or five telegraph-poles of the curve near Summit Siding when I saw the ' washout ' of the flagman's red lamp. We stopped a couple of car-lengths from the observation platform of the passenger-train, but by that time they had gained speed and were pulling away from us.

" And, sure enough, on the platform were Mrs. Ransford and baby Ransford, watching the scenery, secure in the belief that the despatcher, the slim man with a shade over his eyes and a few gray hairs around his temples, would see that no harm came to the train.

" And he did see to it, too, for he got the operator at Summit Siding just as the passenger-train was stopping. The operator at the mine had been quick enough to grasp the meaning of the message, and had connected the branch telegraph-line with the city telephone-line to enable Ransford to call the police-station."

THE PRETTY-NEAR-MISS-ITS.

BY STRICKLAND GILLILAN,
Author of " Off Ag'in, On Ag'in, Gone Ag'in, Finnegan."

AT every station in every nation,
Let trains be on time or a little bit late,
There's always some person (named Smith or McPherson)
Comes galloping through as they're closing the gate.
They grab for that train like a pleasure illicit—
There's always somebody to " pretty near miss it."

ONE wonders just why, 'neath the South's sunny sky,
Or under the northermore canopy chilly,
There's always some critter (named Thompson or Ritter)
Picks out the last moment to run like a silly
And cling to that train just as though she would kiss it—
There's always some ninny to " pretty near miss it."

THERE'S no known arrangement 'twixt those whose derangement
Impels them to pull this identical bone.
The psychic detectives would call them defectives—
We roughnecks have made up a name of our own.
We call them dee-effs and we make it explicit—
These nuts who habitually " pretty near miss it."

POWER FROM POWDERED COAL.

Fuel Ground Fine as Flour Blown into Firebox Generates Gas and Gives Tremendous Heat without Waste.

GOOD-BY SMOKE, SPARKS, CINDERS, NOISE.

Invention Holds Up Chicago's $275,000,000 Electrification Plans—Standard Locomotive May Meet Public Objections in Final Test with New Fuel—Inventor Promises Tremendous Saving to Railroads—No More Shoveling for Firemen through This Device—Solves Great Mining Problems.

BY MARLEN PEW.

THERE is magic in the seemingly simple engineering feat of mixing powdered coal and air in correct proportions and exploding it, with proper control, under the boiler of a steam locomotive.

In fact, the practical substitution of pulverized coal for both grate coal and oil, on railroad engines, offers to the future such a staggering array of revolutionary features that it is regarded by engineers as the most important mechanical railroad development of the day.

Locomotives burning pulverized coal, recently put into practical use on the New York Central, the Chicago and Northwestern and the Delaware and Hudson systems, are attracting close scrutiny.

With this fuel, according to authorities, the stupendous railroad coal bill may not only radically be reduced, but such tremendous problems as smoke nuisance, stoking labor, spark danger, soot evil and the noise objection are in a measure met, while, at the same time, coal which has heretofore been unsalable at the mines becomes available for railroad use.

Electrification Plans Held Up.

Because the citizens of Chicago have objected to the visible smoke, the soot and the noise and fire dangers incident to the use of steam locomotives the railroad companies having terminals there have for years been planning a system of electrification, the latest estimate of cost being the great sum of $275,000,000. This amount, it may be added, did not provide for the necessary new track building and relocation of the yards, engine houses and hence the homes of the train crews.

In making these plans, at the urging of the city, the railroads brought out the fact that by this tremendous expenditure they could not expect any increased earnings and in a voluminous report on the

smoke evil the Chamber of Commerce admitted that the cost of electrical equipment was entirely inconsistent with the objects sought.

At about this time the practical application of powdered fuel to locomotives came to view and as a direct result of the discovery that the public objections to steam locomotives are in large measure overcome by the use of coal in this form the gigantic electrification scheme has been held in abeyance, while the Chicago Chamber of Commerce, the city officials, and the management of the railroads observe the practical development of the device for burning the new fuel.

Such are the amazing potentialities of powdered coal in railroad use.

The invention comes at a time when the railroads are bending under the weight of an annual fuel bill amounting, according to the Interstate Commerce Commission, to $275,000,000, or 25 per cent of the transportation expense of 242,657 operated miles of track.

America is awakening to the fact that there is a bottom to the oil well and an end to the wonderful natural coal beds.

JOHN E. MUHLFELD.

THE DRUG CLERK WHO INVENTED A SYSTEM BY WHICH AIR AND POWDERED COAL ARE MIXED, FORMING A GAS WHICH GIVES INTENSE HEAT WITHOUT SMOKE AND AT A SAVING THAT MAY AMOUNT TO AS MUCH AS $100,000,000 A YEAR.

A tremendous call for coal for export is at hand, and conservation is the word of the hour.

What a general railroad use of pulverized coal would mean to the mining interests may be quickly imagined. It is estimated that the railroads consume more than half of the coal mined in the United States.

With the development of the locomotive the finest qualities of coal have been demanded. Coal that is now considered mere refuse in the powdered form may be as satisfactory as the finest large sizes, thus reduced.

In instances it is known that as high as 55 per cent of the coal the operators pay to have mined is rated as of small or no value, because of its unfitness for burning in grates. These unsalable or low value products are such as culm, slack, sweepings, screenings, and dust. All may in the future be advantageously mined and utilized.

Chance for Firemen.

The fireman of the locomotive burning pulverized coal, instead of laboriously working with a shovel the major portion of his time, becomes a real assistant engineer.

He works with his head, instead of his body.

He sits at the window of the cab operating a system of levers and gages which automatically feed into the firebox powdered fuel and air, in requisite proportions and in quantities consistent with the varied needs of the locomotive in operation. He sees, also, the track and the signals.

The fireman of this locomotive watches his engineer and gives him the fire and the power he requires for the work in hand. The skilful fireman will so regulate his fire as to conserve fuel, gaining the maximum of power from the minimum of coal consumption. Spared the irksome toil of shoveling coal this fireman, who is to graduate to the position of engineer in the course of time, is brought more into contact with the actual science of engineering and, it is foreseen, is better fitted for the future task.

The best and the quickest impression to be had of the remarkable operation of the locomotive fed with pulverized fuel may be gained from a study of the sectional picture of the device invented by Mr. John E. Muhlfeld, of New York, which is published with this article.

Tender Fuel-Container Is Enclosed.

As will be noted, the tender fuel-container is enclosed, preventing loss of coal, as this form of fuel is as fine and as dry as Portland cement and has somewhat the velvety quality of graphite; the covering also prevents the absorption of moisture, practical use of powdered coal showing that moisture in coal goes to impair the heat volume.

The fuel is fed into the supply inlet at the top from specially equipped fuel stations, where the dried coal may be stored or where the pulverizers and drying paraphernalia may be located.

With the fuel practically dry it does not cake or form and it easily gravitates to the screw conveyor at the base of the container.

With a steam turbine or a motor propelling the screw conveyer and simultaneously operating the pressure blower the powdered fuel is carried to and then blown through a flexible nozzle into a chamber under the rear of the cab floor where it becomes mixed with air taken in from a good-sized vent.

It is right there that the secret value of the contrivance is established.

The fine dust, now whirling along toward the firebox, is being prepared for combustion under the most favorable chemical circumstances. The coal particle, which is carbon, is mixed with two identical parts of air, oxygen, a combination which, in combustion, gives off maximum heat without loss of material.

It is this commingling in proper quantities of carbon and oxygen that turns the big trick.

A bit of burning waste tossed into the combustion chamber, at the base of the firebox, sets this gaseous substance into a furious blaze, the heat passing on through the boiler, the necessary draft being obtained by means of the usual stack steam blower.

From 45 to 60 minutes is the time required to get up 200 pounds of steam from boiler water a little above freezing in temperature. When the locomotive is steaming, the main exhaust is utilized for draft, the air being regulated by dampers and the fuel supply by the feeders.

When heat has been generated it must be understood that the locomotive is actually burning gas.

The fireman feeds the fuel as it is needed. When the engine is drifting or standing at sidings or terminals the coal supply may be entirely cut off. When more heat is needed the fuel and air are turned on and the gas begins to explode again from the heat of the brick work.

There is no " blowing " or " back fire " as in the instance of fuel oil. The exhaust nozzle is about 25 to 50 per cent larger in area than where grate coal is used. This cuts down the noise.

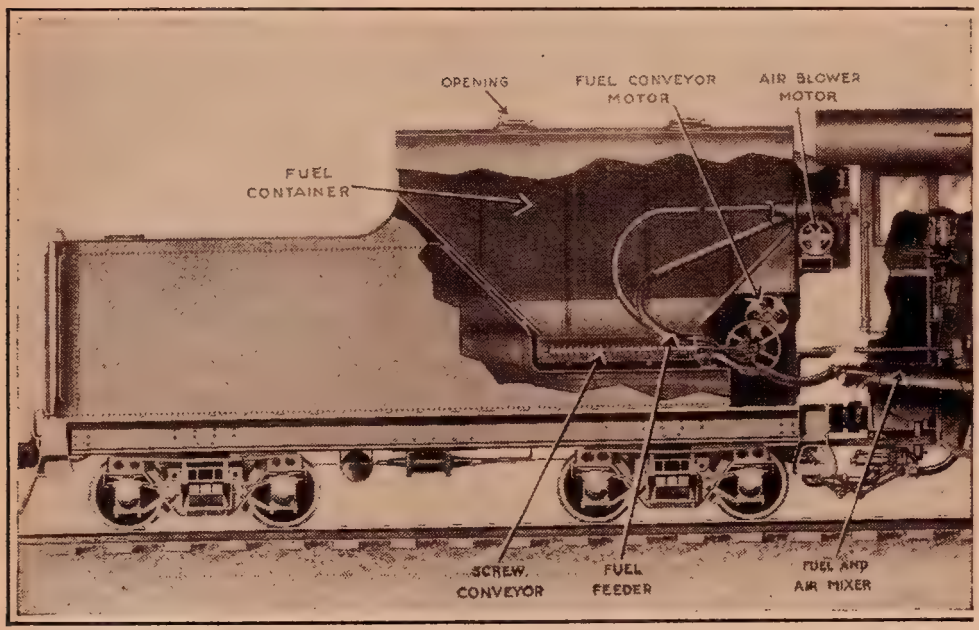
Secrets in Coal.

In order thoroughly to understand this bountifully promising invention it is necessary to fully discuss coal combustion under these circumstances. Early in the 19th century coal dust was known to be a dangerous, that is an explosive substance. Investigations have revealed that any organic dust of a certain fineness, suspension and temperature has an affinity for oxygen and is explosive.

So-called spontaneous combustion of dust in grain, soap, sugar, and planing mills, and in mines is a common occurance where care is not taken to prevent the accumulation of dust.

The tiny particles in combination with particles of oxygen burn with such high velocity as to cause an explosion.

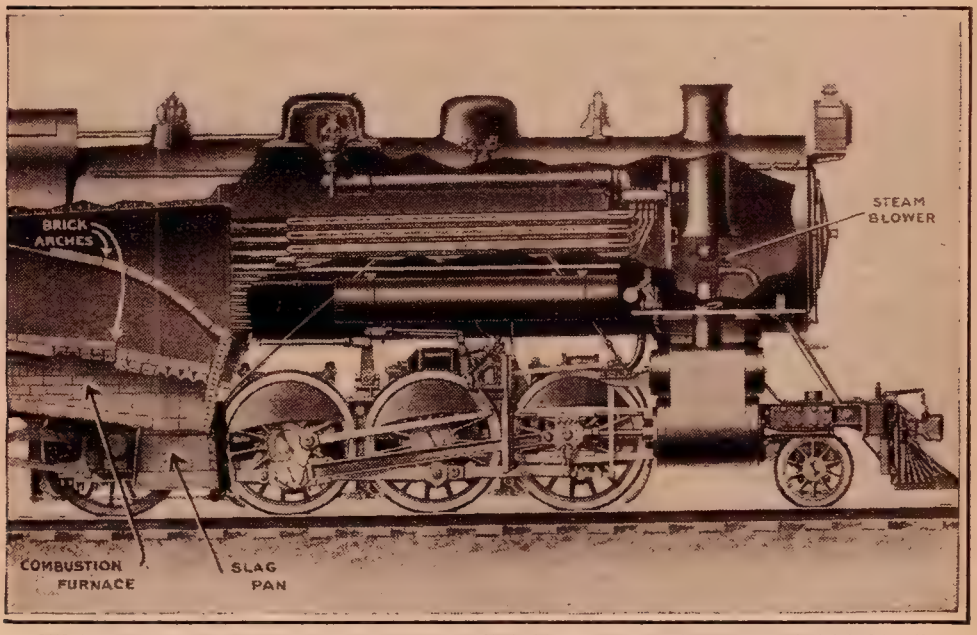
Powdered coal gives off gas at normal atmospheric temperature, but any pul-



SECTIONAL VIEW SHOWING HOW COAL GROUND FINE AS POWDER IS TAKEN IN AT THE OPENING OF THE TENDER TANK, CONVEYED TO A FEEDER BOX, BLOWN THROUGH FLEXIBLE TUBE TO AIR AND FUEL MIXING CHAMBER, THENCE IN THE FORM OF GAS INTO THE COMBUSTION CHAMBER.

verized coal which is too large to pass through a 100-mesh screen is liable to explosion only when distilled by the heat or by the compressive force of a primary ignition.

The finer, powdered coal is not dangerous unless combined in a dry state, in floating suspension in nearly still air, with the requisite amount of oxygen at the right temperature to produce primary ignition.



ONLY A SMALL QUANTITY OF SLAG FORMS IN THE SLAG PAN AND THERE IS PRACTICALLY NO SMOKE, NO CINDERS, NO SPARKS AND BUT LITTLE NOISE. AND—HERE'S GRAND GOOD NEWS FOR THE SMOKE-BOYS—THE FIREMAN NEEDS NO SHOVEL.

Colossal Waste in Black Smoke.

The black smoke that issues from locomotive stacks is wasted fuel. It is carbon from which combustion and therefore heat have not been obtained. Authorities differ as to the average loss of coal up the stack, but all agree that it is very considerable.

Inasmuch as complete combustion is obtained from pulverized coal, each little particle being entirely destroyed, only a white, feathery ash or a tiny speck of slag remains. The ash blows out of the stack or lodges in the front end, while the slag is precipitated to the slag-pan. The writer has seen from the New York Central's powdered coal locomotive a scant double fistful of slag taken from the slag-pan as the refuse from four hours of heavy steaming.

Instead of smoke coming from the stack there is a light gray and very thin gaseous substance or ash dust to be seen when the engine starts out, but this lessens and almost disappears as the locomotive gets well into action.

For a quarter of a century pulverized coal has been used with success in special stationary heating plants where intense heat at low cost was demanded, such as in cement kilns and metallurgical furnaces.

After 15 Years of Experimenting.

Although the railroads have been tinkering with appliances to burn pulverized coal on locomotives for 15 years, first on the Chicago and Northwestern and later on the Illinois Central, no practical method, standing the test of every-

day use, has been devised, so far as is known, until the present time.

For the benefit of the readers of the RAILROAD MAN'S MAGAZINE Mr. Muhlfeld, the inventor, a young man plainly animated by that dynamic force which is characteristic of dauntless Americanism—the stuff that makes the wheels go around—was asked to explain the device and make an estimate of its potentialities.

He said that he had been working on the invention, now internationally patented, for three years. The first year was given over almost entirely to investigation and research and the preliminary development work. He secured a steam locomotive and it was fitted up as a moving power plant.

It was on this locomotive that the theory was reduced to practical operation and the processes evolved which have now been accepted by six railroad companies, with the managers of all of the great railroads of the world making investigation.

On the same day that I interviewed Mr. Muhlfeld he had met and explained his device to a commission representing the railroads of France, England, and Belgium.

Inventor Started as Clerk.

The inventor started life as a drug clerk and later engaged in the coal, lumber, and railroad businesses at Peru, Indiana. When he was not studying mechanical engineering at Purdue University he was earning his way as an engine wiper at the Wabash railroad shops.

Since then he has filled many important railroad positions with the Wabash, the Grand Trunk, and the Baltimore and Ohio railroads. He is identified with many railroad and engineering societies and is held as a high authority upon railroad matters and is noted for his construction work. A conspicuous achievement was the adaptation of the European Mallet type of steam locomotive to American railways. He has patented various mechanical devices.

He said: "As to the practicability of the use of pulverized coal by means of our conveying, mixing, and burning device, the best I can say is that the locomotives now operating on three railroad systems, soon to be augmented by installations on the Missouri, Kansas and Texas, the Santa Fe and the Central Railroad of Brazil, are giving satisfaction and meeting my claims for them.

May Save $100,000,000.

"The present annual consumption of about 7,000,000 tons of powdered coal in industrial kilns and furnaces in the United States seems to demonstrate the effectiveness and economy of this form of combustion and to call for its adoption on steam locomotives.

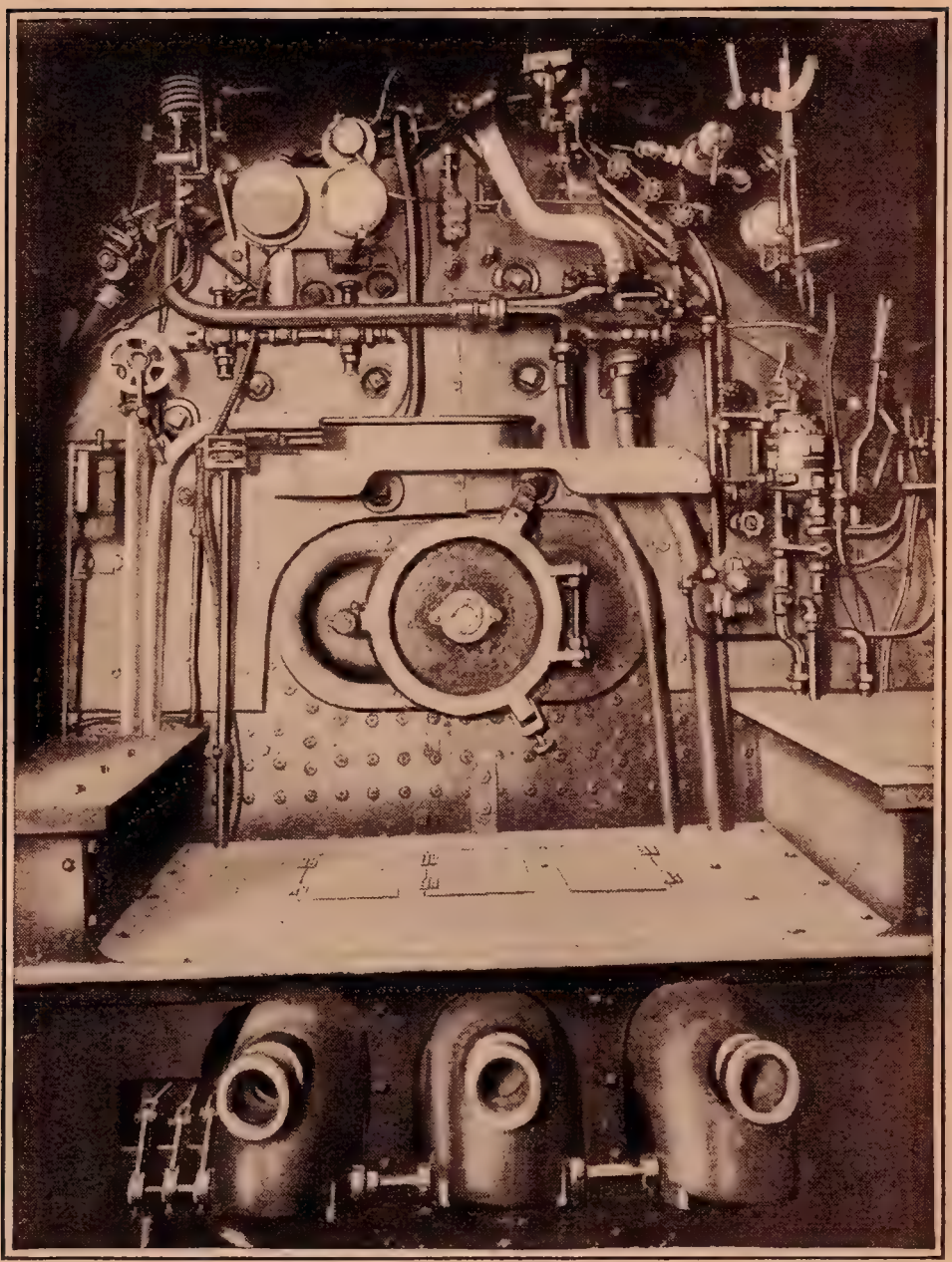
"It is conservatively estimated that from 20 to 40 per cent of the national coal bill can be saved by the use of powdered fuel. This would amount to from $50,000,000 to $100,000,000 per year. The country is beginning to feel the need of conserving both coal and oil. Our limited resources make the future very doubtful for the railroads on the present basis of consumption.

"Powdered coal will take up an enormous quantity of fuel now wasted at the mines, including dust, sweepings, slack, culm, and other small sizes, as well as coke breese, lignite, and peat.

"The demand of the railroads is for a locomotive which eliminates smoke, soot, cinders, and sparks; reduces noise, time for despatching at terminals and standby losses, with increased daily mileage and more nearly continuous service between general repair periods.

"The railroads want a locomotive which will produce the maximum hauling power per unit of total weight, at the minimum cost per pound of draw-bar pull and the least liability for mechanical delay. This is particularly brought out by the agitation for reduced time in making runs with freight trains between divisional terminals.

"Pulverized coal meets these demands.



HERE IS WHAT THE BACK OF THE BOILER HEAD OF THE POWDERED-FUEL LOCOMOTIVE LOOKS LIKE. THE FIREBOX DOOR NEED NEVER BE OPENED, EXCEPT FOR REPAIRS. THE FIREMAN STANDS TO THE LEFT OPERATING THE MECHANISM WHICH FEEDS COAL AND AIR, IN CORRECT PROPORTIONS, FROM THE TENDER INTO THE COMBUSTION CHAMBER.

It will give greater accomplishment than in the instance of stationary use. It will not only reduce the amount of coal burned, but it will take up the waste and therefore the cheaper coal."

The inventor itemized some of the additional advantages of pulverized fuel as of great interest to all railroad men. It produces firebox temperatures and sustained boiler capacities equivalent to or

exceeding those obtained by the use of fuel oil and from 10 to 15 per cent over grate coal. It reduces the costs of maintenance, operation and inspection, eliminates waste and reduces objectional features to such an extent that electrification of terminals in cities may be obviated.

Device Aids Firemen.

Mr. Muhlfeld laid special stress on the fact that with the new fuel firemen need not be selected according to physical ability. The work becomes more attractive and less laborious and the fireman becomes a real aid to the engineer in observing track and signals, a new measure against accident.

The invention discards grates, ashpans, smoke box nettings, firing tools and expensive cinder pits and eliminates incidental cleaning labor. It insures clean boilers and flues as well as a clean front end.

He declared there was no destructive impinging action on the firebox sheets or brick work as might be the case were the gaseous fluid to be forced as in a blow pipe.

As no fuel is fed by hand and grates are eliminated there is no liability for "holes in the fire," "banking" and "clinkering" to cause waste of fuel or shortage of steam. No unprofitable time need be spent at terminals in fire, ashpan and flue cleaning, while the time for firing up and for inspection is cut down.

"We know now," said the inventor, "that the heat in the brick work will reignite the fire after the coal supply has been cut off for an hour and a half. It comes down to a proposition of burning coal when you need it, not constantly for the sake of a fire.

"A locomotive with a full boiler of water and 175 pounds of steam can be left standing without fire for 10 hours and still have 80 to 90 pounds of steam left, which will enable firing up with its own boiler pressure."

The first steam locomotive to be adapted with a successful self-contained equipment for the burning of pulverized fuel in suspension, was a ten-wheel type on the New York Central Railroad, equipped by Mr. Muhlfeld. This engine is to-day operating between Albany and Utica. It has 31,000 pounds tractive power and has been burning pulverized coal for two years.

The next fine coal engine made its appearance on the Chicago and Northwestern. It is of the Atlantic type. It is to-day in passenger service on what is said to be the fastest railroad schedule in the world, between Chicago and Milwaukee, the 85-mile trip being made in two hours.

The third powdered-fuel locomotive was the new giant consolidated type, with about 63,000 pounds tractive power, built at the Schenectady works of the American Locomotive Company. It was designed for combination fast and tonnage freight by J. H. Manning, Superintendent of Motive Power of the Delaware and Hudson. This engine was built especially as a powdered-fuel locomotive. Those previously mentioned were grate burners converted to use powdered coal.

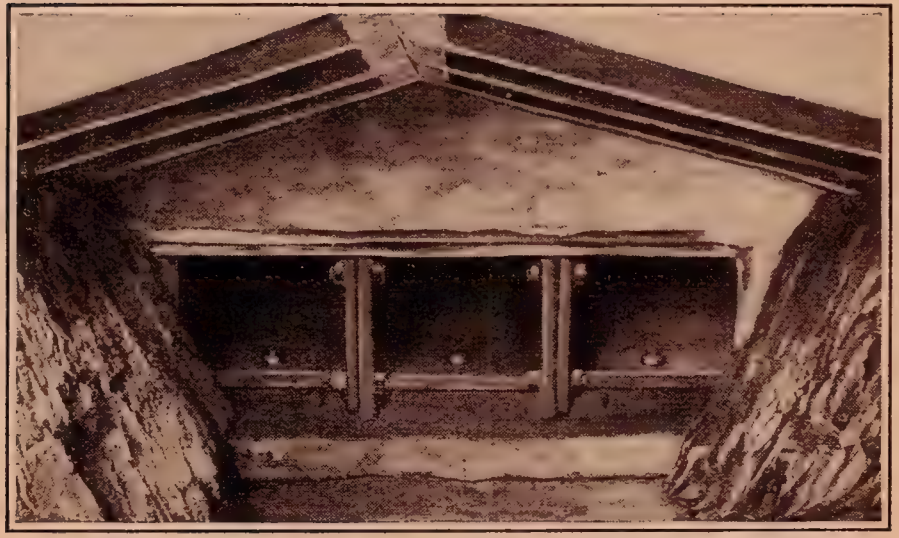
What Manning Says.

Discussing the work of this locomotive Mr. Manning said: "We started out with the idea that we could burn 100 per cent anthracite coal in powdered form, but we soon found that the coal was too low in volatile. We have succeeded in very successfully burning a mixture of 55 per cent bituminous and 45 per cent anthracite, and the percentages may be reversed.

"We have worked the engine from 7 to 11 hours a day, without it giving us any trouble. The anthracite we burn is culm or slush coal that runs about 70 per cent in carbon to 16 to 30 per cent in ash and a low per centage of volatile. It is necessary to boost that volatile up with bituminous coal."

Mr. C. W. Corning, chief smoke in-

VIEW OF FRONT OF TENDER ON POWDERED-FUEL LOCOMOTIVE, SHOWING MOTOR WHICH DRIVES THE SCREW AND PNEUMATIC FEEDING-APPARATUS AND THE TOPPED TANK WHEREIN THE PULVERIZED COAL IS CARRIED. THIS IS WHAT THE FIREMAN WORKS WITH, RATHER THAN A HEAP OF COAL TO BE SHOVELED.



HERE'S WHAT YOU WOULD SEE IF YOU COULD OPEN THE FIREBOX DOOR. THIS PHOTOGRAPH WAS TAKEN AFTER THE ARCH WAS LOWERED.

spector of the Chicago and Northwestern Railroad, speaking of the powdered coal engine in use on that system, said: "We are running the engine on a first class passenger train and it gives us more steam than we want and the control is perfect. It is not hard to learn to operate. I can educate a fireman in 12 minutes.

"So far as the smoke is concerned the only semblance of smoke is when you first start out; that is more in the form of dust. After you have run a while, perhaps a mile, that disappears. After you have run 30 miles you have only steam coming from your stack.

"We have experimented with North Dakota lignite and it burns very successfully. You can apply all three burners and you will not see any smoke, only a light gray dust coming from the stack."

After running 900 miles this locomotive had less than one cubic foot of slag in the slag pan, which practically eliminated cleaning. A late report from the Chicago and Northwestern management is that the engine saves from 15 to 30 per cent in fuel.

The policy of the New York Central railroad management is to withhold any discussion of the powdered coal locomotive until experiments have been made with all grades of coal.

New Fuel Stations Necessary.

The item of preparation of powdered coal for locomotive use is of importance and is being widely discussed by technical men. In general it has been established that powdered fuel should not contain more than one per cent of moisture to be highly efficient and it must be of uniform fineness.

It is agreed that the coal must be dried by artificial heat, before it is ground.

The reduction of heating-value is estimated as two per cent for each one per cent of moisture contained in the coal.

The need of uniform fineness is accounted for by the fact that absolute assurance is given that each particle will be gasified and burned when suspended in its air supply.

Suitable storage, crushing, drying, grinding, and conveying plants are to be installed at coaling stations. Mr. Muhlfeld estimated that coal properly prepared at such plants, where the capacity was from four to ten tons an hour, would cost from 20 to 25 cents per ton for such treatment. "But," said he, "this will be more than offset by the difference in price between the small-sized coal we would require and the cost of ordinary grate coal."

Dollars Up in Smoke.

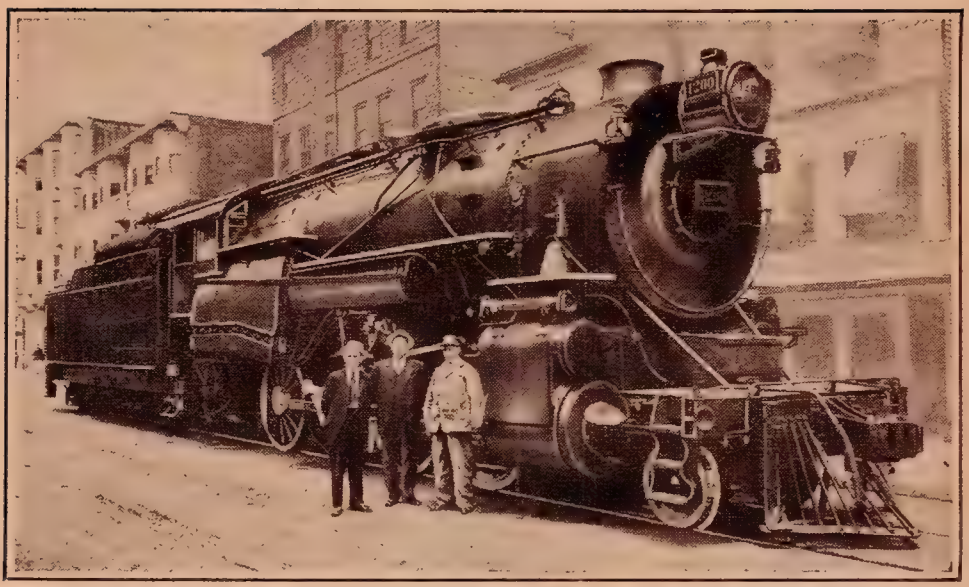
Some mathematical wag might figure the loss to America that is daily going up the stacks of industrial plants and locomotives, due to the non-combustion of fuel in furnaces and fireboxes.

It has been estimated that in Pittsburgh $1,500,000 goes up in smoke annually, while the damage done to merchandise and buildings by soot is given as $10,000,000 per annum. Taking these figures as a basis, the gentleman of leisure, with plenty of pads and pencils, could doubtless show a national loss in excess of the national debt.

It is important to note that the Standing Committee on Powdered Fuel of the International Railway Fuel Association has recently reported that the results being obtained from the locomotives now burning pulverized coal in the main confirm the predictions of the inventor of the device applying this power to locomotives.

The committee found that the engines were "smokeless, sparkless, and cinderless," saved from 15 to 30 per cent in the fuel bill, gave from 7½ to 15 per cent added boiler efficiency as compared with the use of grate coal, eliminated various expenses and operation delays, did not punish the firebox or boiler equipment and put the fireman in a position of more efficient service.

The report concluded: "The constantly increasing cost of railway fuel at the



GIANT DELAWARE AND HUDSON LOCOMOTIVE, EQUIPPED WITH MUHLFELD PULVERIZED-COAL EQUIPMENT, SHOWN ON ATLANTIC CITY TRACK WHERE SCORES OF RAILROAD OFFICIALS INSPECTED IT. THIS NEW CONSOLIDATED TYPE HAS ABOUT 63,000 POUNDS TRACTIVE POWER.

mine, the scarcity of fuel oil, the domestic and export demand for larger sizes of coal; the prohibitive cost for briquetting the smaller sizes of coal and of lignite for railroad use; the payment for labor on the run-of-mine basis for mining bituminous coals; the necessity for eliminating smoke, sparks, and cinders, will all tend toward the inauguration of this practical means and method for increasing the efficiency of steam boiler operation which to-day affords the greatest opportunity for improving locomotive and power plant costs and performance, and for changing public sentiment by smoke abatement."

THE NATIONAL GUARD.

BY LYDIA M. DUNHAM O'NEIL.

YOU may call 'em "the governor's pet,"
"Society poodles," and all;
You may grin when they run to get out of the wet;
You may jeer at their softness, and sneer at their sweat—
But they know how to handle a rifle, you bet,
And to charge at the bugler's call!

"THEY'RE proud of their uniforms"—yet,
Ain't it something to *be* proud of, pard?
And soon they'll get used to the heat and the wet,
They'll harden and toughen like any ol' vet,
An' they'll give good account of themselves, don't you fret—
Those boys of the National Guard!

THE THROTTLE WIDE OPEN.

Worker, Investor and Manufacturer Alike Profit by the Huge Earnings of the American Railroads.

The Western Maryland has ordered 10 Mallet type locomotives.

The Union Tank Line has arranged for the construction of 2,250 cars.

The Southern Railway ended its fiscal year 1916 with over $9,000,000 surplus.

The Chicago and Northwestern is inquiring for 3,200 freight-cars of various classes.

The Chesapeake and Ohio earned almost 11 per cent on its common stock last year.

The American Locomotive Company is making 100 locomotives for the British War Office.

The Pennsylvania will spend $650,000 enlarging its yard at Morrisville, Pennsylvania.

The Westinghouse Air-Brake Company declared a special dividend of 10 per cent last fall.

The Baltimore and Ohio and the Atlantic Coast Line are both in the market for 1,000 freight-cars.

The Illinois Central spent over $6,000,000 last year for additions and betterments to road and equipment.

The Missouri Pacific has ordered 1,500 general-service cars from the American Car and Foundry Company.

Power on the Buffalo, Rochester and Pittsburgh is to be increased to the extent of 10 Mikados and 5 Mallets.

The Southern Railway will spend $400,000 for a new office building in Washington, District of Columbia.

The Alton and the Rock Island have both raised their shopmen, the increase ranging from 1½ to 2½ cents an hour.

The Boston and Maine's operating revenues increased over 11 per cent last year, and its expenses went up only 1 per cent.

The Baltimore and Ohio has increased the pay of telegraphers an average of over 8 per cent. About 1,600 operators profit thereby.

Two million dollars is to be spent by the Chicago and Northwestern in elevating its tracks at various points in Cook County, Illinois.

In a single recent month the railroads of the United States and Canada placed orders for 243 locomotives and over 9,000 freight-cars.

At one time last year there were 57,000 freight cars on the New York, New Haven and Hartford and the Central New England roads.

For the first time the Chicago, Milwaukee and St. Paul has passed the one-hundred-million mark in gross earnings over a fiscal twelvemonth.

Hocking Valley's net income available for dividends at the close of the fiscal year 1916 were over twice what they were the year before.

While double-tracking between Orange, Virginia, and Central, South Carolina, the Southern Railway eliminated 93 highway grade-crossings.

In the twelvemonth ended July 31, 1916, we bought back from European investors no less than $807,881,666 of American railroad securities.

The capacity of the Southern's railroad yards at Pomona, South Carolina, is to be increased more than threefold—from 359 cars to 1,188 cars, to be exact.

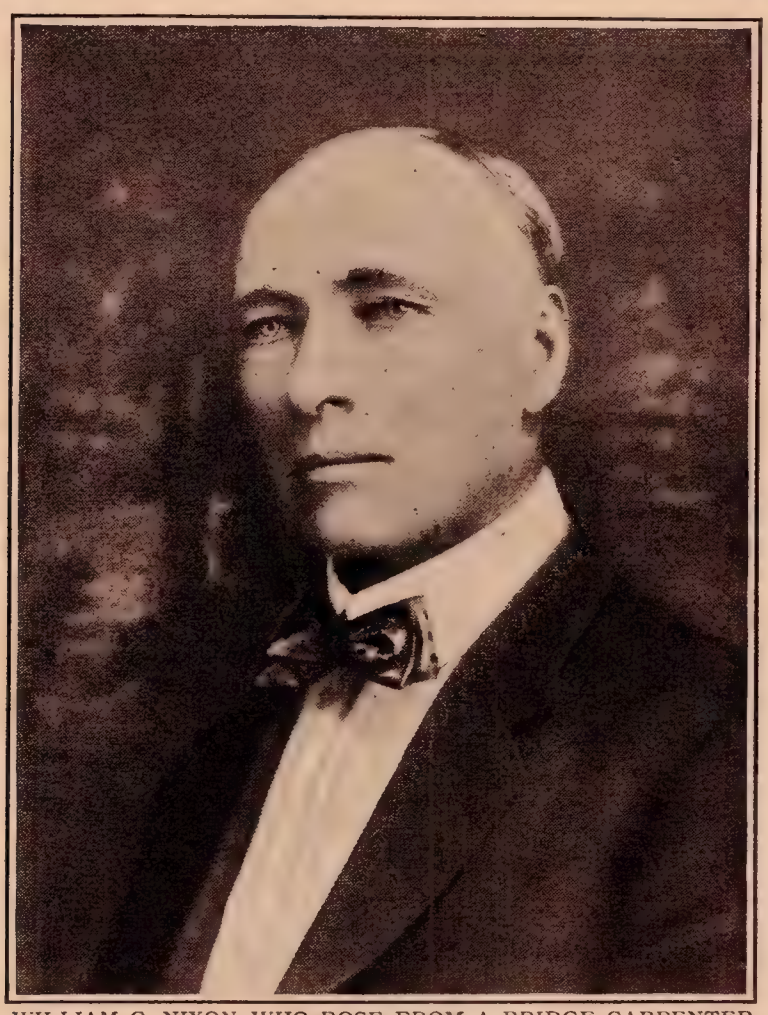
In the fiscal year 1916 the railroads of the country showed operating revenues of $3,396,808,234, an average of $14,818 per mile of line. Net operating revenue amounted to $5,134 per mile. The increase in aggregate operating revenues over 1915 was 16.9 per cent per mile of line; the net increased 36.4 per cent.

The Atchison, Topeka and Santa Fe shows gross earnings for its fiscal year of 1916 amounting to $133,762,392, beating its 1915 record by more than $16,000,000 and setting a new high-water mark in the company's history. It earned the equivalent to 12.30 per cent on its common stock, as against 9.18 per cent the year before; and in the mean time the amount of common outstanding has been increased from $200,489,500 to $214,312,500.

Some of the roads in the market for cars, together with the number and kinds wanted, are: Missouri, Kansas and Texas, 1,000 stock; Chicago, Burlington and Quincy, 1,500 box; Union Pacific, 1,500 box and 1,000 automobile; Illinois Central, 2,000 composite gondola; Philadelphia and Reading, 2,000 hopper; Pennsylvania, 4,000 to 6,000 steel underframe; Baltimore and Ohio, 1,000 side-dump hopper; and Great Northern, 1,000 refrigerator and 2,000 box.

Contracts have been awarded by the Southern Railway for the foundation work for a 20-stall roundhouse and 100-foot turn-table at Alexandria, Virginia. At this point the line will also install a mechanical coal-handling plant with 100,000 tons storage capacity, electrically operated cinder-pits, water-tank, sand-plant, small shop for running repairs, storehouse for oil and other supplies, and wash and locker-room for employees, together with the necessary tracks to link up this network of buildings.

NEW HEAD OF FRISCO SYSTEM.



WILLIAM C. NIXON, WHO ROSE FROM A BRIDGE CARPENTER TO RAILROAD PRESIDENT.

MR. NIXON, the new president of the reorganized St. Louis and San Francisco Railroad, was born February 15, 1861, at Earlville, Illinois. His first railroad job was with the Burlington and Missouri Railroad, as a bridge carpenter.

In 1885 Mr. Nixon was made trainmaster of the Southern Kansas Railway, remaining in that position until 1889, when he was transferred to Kansas City as superintendent of terminals there. Promotions to superintendent of the Chicago division and superintendent of terminals at Chicago followed, and later he was advanced to general agent, freight department.

For three years Mr. Nixon was superintendent of the lines between Chicago and Kansas City, and in 1900 he was shifted to Galveston, Texas, as general superintendent of the Gulf, Colorado and Santa Fe Railway. In 1902 he was made vice-president and general manager of the Frisco lines, and on May 1, 1911, he was appointed senior vice-president. May, 1913, saw him made chief operating officer under the receivership, and in July of the same year he was appointed receiver and chief operating officer.

HONK AND HORACE.

BY EMMET F. HARTE.

If Horace Doesn't Lavish a Costly Gift on You This Yuletide, Honk Should Own to the Onus.

"BUT I'VE MADE A DATE WITH HER FOR YOU," HE SAID WEAKLY AFTER A PAUSE.

THIS is a Christmas story, and I trust 'twill also serve to inform the teeming horde—I mean host—of my many friends, admirers, and relatives as to why I am sending them merely inexpensive picture-cards this Merry Christmas instead of the costly gifts I had originally planned to lavish to the right, and also to the left.

I hope I won't be deemed guilty of bombast when I say that I'm naturally generous to a fault. I hope *not*. The fact speaks for itself, of course, but I must emphasize it, distasteful though it may be to one of my innate modesty and diffidence to thus indulge in personal—er—um—yes, analysis.

But seriously, my generosity would often lead me into uncharted morasses of extravagance if it were not for one thing. I also possess a saving grace of canny common sense.

By canny common sense I mean that I'm not easily bamboozled by the bogus glitter of counterfeit pomp. I take no credit for this latter faculty, trait, tendency, or characteristic of mine; not at all. It's inherited.

The coat-of-arms of our family—as maybe I've mentioned before some time—bears the device of a porcupine couchant before a barking dog rampant, and the motto (from the Crow Indian tongue) of "Bunko Nitto Cheesit!" which means literally: "We who have gazed upon the Gasconade River bluffs cannot be flimflammed with golden ingots made of brick cheese." So you see— However, that by itself would make a story if gone into.

As I've already hinted at, I had made preparations to branch out a bit with my Christmas (or Xmas if you prefer) presents this year. By dint of relentless stinting I had succeeded in salting away in a safe place, whose whereabouts I'd even kept secret from my confident and bosom chum Hancock Simpson, a sum of money amounting in round numbers to the grand total of $21.45.

This goodly figure I expected to expend liberally (and generously) in the purchase of expensive presents to be distributed graciously and likewise gratuitously among my near and dear ones, both kin and unkin. And the Christmas story previously outlined, which is now about to follow, will relate the why and wherefore of what intervened unfortunately to interfere with my cherished purposes.

Are we all straight, now? Xmas atmosphere, snow glinting on the hills, jingle of sleigh-bells, turkey and cranberry sauce, $21.45 laid by for gifts, and everything propitious to the proximity of the Yuletide season.

Well and good. Enter Hancock Simpson, spoilsport.

I knew Honk had something on his mind that December day; all afternoon I knew it as we busied ourselves at our daily tasks at Valhalla station. Long association has made me familiar with the signs and omens which accompany Honk's mental attitudes. I can read him like a set of child's building-blocks.

Sometimes he's garrulous to a degree; that's when he's trying to conceal something from me. Then again he's morose; then's when he's aching to confide in me, but is uncertain just where and how to begin.

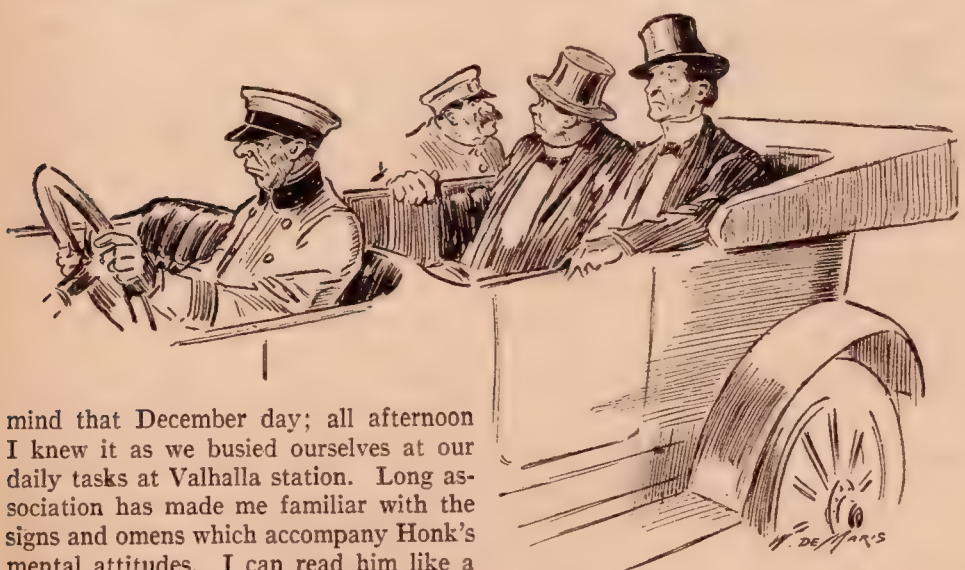
This time he was sort of secretly confidential. Talkative in a vapid, pointless, roundabout fashion after the manner of a small boy who has room for one or two more pieces of pie, but has been strictly enjoined not to ask for same in so many words. For instance:

"Bruce Taylor's been called out of town on urgent business for a week or ten days. I saw 'm this morning when he was leaving. Said he positively wouldn't be back before a week from Wednesday."

(Now the said Bruce Taylor is traveling freight-agent for the Transcontinental's Leased and Operated Lines, Western Division, but how or why his absence for a week, or a hundred weeks, affected Honk or me one way or the other was a thing I couldn't for the life of me see.)

"Um—zat so?" I murmured. "How depressing. I'm grieved to hear it."

"Yes, I knew you would be," Honk went on cheerfully. "Do you know Miss Doris Keats, the young lady Bruce—the



"WHAT WUZ THAT YOU WUZ GITTIN' OFF, SPORT?" ASKED THE COP RUDELY OF ME.

divinity he has been paying court to lately?"

"I've met her formally," I admitted non-committally. "I fancy she's been raised a pet—no, yes?'

"A remarkably beautiful and charming young woman," Honk pursued. "You know she's quite a belle in the younger set of the one hundred. Much sought after. Comes of a fine old aristocratic family.

"Father's worth a mint o' money. Made it in range cattle, but of late years has gone in for alfalfa and hogs.

"Doris has a girl friend visiting her this week—a Miss Duckworth from the South. Vicksburg, or maybe Mobile, I disremember exactly—"

"Well, what of it?" I growled, a little irritably. "She might be from Chickamauga, or Tombigbee on the Suwanee, and yet not disturb the even tenor of my waking dreams a single jot, to say nothing of a tittle."

"Ah, then you don't like her?" he said somewhat anxiously.

"Like her? Why, I don't think a thing about her. She doesn't concern me in the slightest. She fails to enter into my affairs in any way whatsoever. The idea!"

"But I've made a date with her for you," he said weakly after a pause.

"A date!" I echoed. "With me? For her? The deuce you— Come, come, explain yourself, will yuh!"

This was the opening he'd evidently been fishing for, it seemed, as a sudden gush of explanations, mingled with ebullient encomiums bubbled up out of him in a kind of verbal geyser that all but overwhelmed me.

"You see, it's like this, Horace. I've made an engagement with Doris for tomorrow evening. We're to dine at the Palazzo, and—and—er—I took the liberty of arranging for you to—ah—entertain Doris's lady friend from the South. Your folks came from somewhere in the South, didn't they? Oh, yes, Kentucky, I believe.

"You and Miss Duckworth ought to hit it off fine together. Besides, I'm depending on you, Horace. You surely aren't going to back down at the last minute and humiliate me, I hope."

Now the underhand allusion embodied in the words "back down" was what caused me to lose my head. He was putting the proposition in the form of a "dare," and that's the one form of invitation I can't persuade myself to refuse.

"Me back down?" I retorted, my crest rising instantly. "What from? I don't think you'll find any cases recorded where I crawfished from anything, my friend. If you imagine that I'm scared of any one you could meet socially, you better guess again."

"That's exactly right," he said, displaying a lack of pugnacity that was somewhat unusual with him.

I thought at the time that he merely realized the futility of a controversy with me, but I've since decided that he was dissembling in order to make me his miserable dupe. And then he went on to explain at great length.

It having been arranged that I was to join him in his little skirmish into swell society, we talked the matter over calmly.

"You understand that this is the real article, my son," he took pains to impress upon me. "These people are regular folks, none of your helter-skelter, soup-counter, cheap-beanery sort. You want to bring your polished manners with you, old social lion; and, by the way—please don't forget and wear that polychromatic vest of yours, Horace. I mean the one with the butterflies embroidered upon it; leave that at home as a special concession to the gods of good taste."

"Well," I returned, "since you've asked it of me in a fair-minded way, I'll be glad to leave it off. In return I might suggest that, as a favor to me, you would refrain from wearing that excruciating red necktie you revel in—"

"I shall respect your wishes," he said hastily, without debate.

"And now about the expenses—" I began.

I ONLY GRAZED HER HEEL SLIGHTLY WITH MY FOOT.

"Pish, tush, Horace," he interposed airily. "There's no hurry about that part of it, you know; no hurry at all; leave it all to me."

I took him at his word. When he said, "Leave it all to me," I interpreted his meaning to be, "Let me attend to everything, and you and I will arrange to share the outlay between us, later on."

I understood it to be a kindly act on his part to thus undertake all the worry and bother of our blow-out—er, that is, our *evening* out, perhaps I should say—and I hoped I appreciated it. I knew that he was not a spendthrift, and absolutely dependable, besides being the soul of honesty.

"All right, old top; I thank you," I said gratefully, and we let it go at that.

We knocked off duty the next afternoon early, surrendering the cares and active interests of the railroad company to the scant mercies of our assistants. However, I, for one, cast aside the worries of my official position as one sheds a garment in summer, the minute I left the depot.

For a brief space I purposed indulging myself to a little much-needed relaxation. Nothing rejuvenates and enlivens a man (a tired business-man) like change. Change of food, of conversation, of associations, faces, scenery, ideas, outlook, point of view—

I looked forward to meeting this Miss Duckworth from Dixie with considerable anticipation. I also felt a glow of pleasant gratification at the thought of a well-cooked, well-served meal at the Palazzo. I can appreciate good grub as well as the next one; in fact, I'm quite a trencherer when feeling fit, and this evening I felt particularly well. The cost wouldn't be exorbitant, either; six bits, or maybe a dollar a plate wouldn't bankrupt me, for all Christmas was imminent, and I had presents to buy—

We shaved, bathed, and dressed with great precision. Honk said we were to call for the ladies at seven sharp. At six-fifty we issued from our apartments (commonly called the Medicine House), and I became aware of a measured breathing sound which seemed to come from somewhere near by. I traced it to its source in an enormous, silver-mounted, eight or ten-cylinder motor-car drawn up alongside.

Honk entered this opulent conveyance directly, after the chaffer, in full regalia,

had opened the door for him. I say the man was a chaffer from my own knowledge; I knew him; his name is Jimmy, or more popularly "Foghorn" Williams, a driver for the Olympian Auto Livery Co., and particularly noted for his prowess as an umpire-baiter during the bleacher season. He and I had often hobnobbed—But to continue.

I took my place in the stylish equipage without stopping to chat with the chaffer. Honk murmured a few directions, and the car flowed luxuriously off. It was all quite uppish and effete. I sank back languorously in the cush—and then I thought of something.

Big, seagoing automobiles with two extra tires and an expert navigator in uniform are not to be had for a nickel.

The Keats domicil wasn't over three blocks from the Palazzo—only a step, in fact, for four people in the blithesome springtime of their youth. In olden days folks thought nothing of walking three miles to a taffy-pulling, and here we were riding three paltry blocks—at a flat rate of probably $5 for the first hour and $3 per for each succeeding per or fraction thereof.

I straightened up—but reconsidered. I hated to begin holding a post-mortem before we'd hardly got started. Besides, at most we'd not use the machine over half an hour, or a dollar two-bits' worth for my share, so let it go. I contented myself by remarking to the helmsman:

"Faster, James."

The latter would have obeyed the command readily, I'm sure, but for a confounded traffic cop who held us spellbound for five minutes out of pure blundering cussedness. I chafed the bits as the time passed.

"For half a cent I'd read the riot act to that bullet-headed bull—" I said loudly.

"Sh!" said Honk. "You'll only get us pinched and fined five apiece and costs for sassing an officer."

"What wuz that you wuz gittin' off, sport?" asked the cop rudely of me.

"I said that this is bully weather we're having," I told him pleasantly.

"'Tis so," he grudgingly admitted; "but don't let it keep you guys here all night blockin' this here street. Git on, git on, will yuh!"

A block farther on, Foghorn stopped, got down, rubbered under the car, grunted, and began to unpack his tool-kit. I noted the time—seven-ten.

"Something amiss, Williams?" queried Honk in the bored tone of a fashionable man-about-town with more money than brains, and more time than either.

"A flat," replied Foghorn, using a musical term with a far-from-musical meaning.

I started to disembark.

"I'll hel—" I muttered.

Honk's iron fingers restrained me in a velvet grip.

"Your hands," he reminded, "and your clothes—all over grease and dirt. Sit still." I sank back again.

We lost ten or fifteen minutes here. This was the first hour, too; the $5 hour, in other words. I continued to chafe the bit, or bits—two bits, four bits, six bits—and then we got under way once more.

Presently I found that we were more than three blocks from the Palazzo and getting momentarily farther away all the time. I put it in the form of a question—aloud.

"Why," said Honk, "we're going by for Mrs. Delancy Brown-Robertson first."

"Mrs. Delancy Brown—what the bally hello!" I repeated dully. "What's she got to do with it?"

"My dear boy!"

Honk's tone was one of paternal and patient indulgence.

"She's our chaperon, you know."

"Um," I thought grimly. "First we have a car and a chaffer, then a chaperon. Another mouth to feed, in short."

Aloud I said:

"Our chaperon? Whuffore?"

"The proprieties, Horace. 'Twould be absolutely shocking for four young people to be seen dining together unchaperoned

in a public place like the Palazzo. It isn't done. Gracious!"

"Bugs! Nonsense!" I retorted. "It's an absurd custom, and a needless expense. It's likewise a reflection on our good manners. It's the same as saying that we're a pair of rowdies who have to be watched to see that we don't start a rough house. It's a scurrillous imputation that we're irresponsible and non-dependable; that we would steal a kiss, or snatch a lady's pocketbook without compunction if given a chance. I tell you I resent being insulted by such a thinly veiled slur against our reputation as chivalrous gentlemen."

"Horace!" gasped Honk. "You stump me completely. I—I'm pained and surprised to hear such talk coming from you. I—I—"

"Oh, well, let it go," I muttered. "It'll only be a dollar or so more. I guess I can stand for it."

I don't think he quite understood me. His face looked if anything blanker than usual. But before he could enter into a lengthy discussion of the matter we hove to under the lee of the Brown-Robertson villa.

Mrs. B.-R. breezed out and took possession of us. She reminded me of a small, fussy, red hen. Heap big powwow and feathers, you know; a terrific cackling, but mostly empty uproar. She seemed wholly unterrified by two desperate villains such as we were supposed to be, who weren't to be trusted to take a couple of young ladies out to dine at our best hotel without a caretaker along.

Then we dropped by for our real victims, the Misses Keats and Duckworth.

Ensued a regular furor of chirpings and twitterings. All hands talked at once without saying anything. Oh, well, nobody was any the wiser though.

The young ladies were attired in their gladdest, gladsome apparel. On the whole I was quite stricken with admiration. I'm a great lover of high-colored clothes. I know I forgot to look and see whether my friend, Miss Duckworth, was the far-famed beauty she'd been cracked up to be, or not, for her garb held me stupefied and dazed. She was what you might call a kaleidoscope of vivid colors caught at the moment of an explosion in a dye-factory.

And yet Honk had objected to my wearing my butterfly vest! *Sauci Duckworth, nux vomica ganderosa!* (A Latin quotation meaning, "What is sauce for the duck is often rank poison for the gander.")

"Perhaps we would better be starting," burbled Honk presently.

"Right-o," said I debonairly. "*En route,* James."

"Whut's that?" asked Foghorn in his "Yah! Yah! Kill the robber!" voice.

"Take us to the Palazzo Hotel, you stentorian boob, and be quick about it!" I hissed in a husky aside.

"Well, talk plain U. S. to me," snorted my whilom baseball acquaintance. "I ain't no langwidge shark."

To save an unnecessary and boisterous controversy (at $5 an hour), I made no reply.

We reached the hotel in fairly good time. I treated myself to a sigh of relief, as we were well within the hour for automobile hire. I listened to hear Honk dismiss the car, but what was my horror and chagrin to hear him say unmistakably:

"Wait until we need you, Williams."

So enthralled was I in the throes of mental calculation as our happy little party trailed into the glittering and palatial interior of the hotel that I know my small talk must 've sounded vapid enough to 've been called brilliant. I'm gifted in that respect. I merely turn the task of talking over to tongue and teeth, thus leaving my brain free to ponder over more weighty problems.

As we entered the tessellated and scintillating dining-room a consoling thought came to me. The auto would be waiting at a reduced rate beginning with the second hour, of course. My share of the sum saved would amount to a dollar or maybe more—and a dollar saved is a dollar earned.

WHILE I WAS SLOPPING AROUND IN THE MIDST OF MY SOUP, SO TO SPEAK, SOMEBODY THREW THE BOMBSHELL THAT SPOILED THE WHOLE EVENING FOR ME.

In my excitement at this saving thought I would have stepped on Miss Duckworth's train if she'd been wearing one. However, her skirt was of a later and more economical cut, so I only grazed her heel slightly with my foot. She flashed me a dazzling look—of playful malice or hostile good nature, I wasn't quite certain which.

"Excuse haste and wasted effort," I said wittingly.

She pretended to be very angry. Her acting was quite realistic. But we did not come to blows.

It was at this interesting moment that my nostrils were titillated by the elusive but unmistakable odor of juicy baked ham—like the far-famed fragrance of the spiced breeze from Ceylon that greets the listless globe-trotter on his stuffy ship.

I sniffed expectantly, and remembered abruptly that it had been a long time between eats in my particular case. At such times I'm not interested in silly histrionics.

One of the really sublime spectacles in life, to my mind, is the splendid moment when a strong, virile, hearty man—I mean a man of sturdy lung and massive limb, a man of brawn and thew, not an insipid, wafer-eating milksop — scents food. If I was a painter or a sculptor in search of a subject I'd paint (or sculp) something along this line before somebody else beat me to it.

The futurists ought to get busy with that inspiration, by Jove! Study of a man scenting food. Ha! But let be, Dagobert; let be, I say!

The gent-in-waiting ushered us to our table, which, thanks to Honk, I suppose, seemed to be already decided upon. I felt something akin to a thrill of abject gratitude to Honk for having so generously relieved me of all the irksome small details incident to our excursion. But, of course, I expected to help defray the—

And then some one served soup. I'm no enthusiast about soup. Soup's a confounded nuisance.

If the soup-bibber next to you doesn't annoy you with his gurgling and guzzling, you annoy him, so there you are. Soup's not solid sustenance anyway. I say censor soup, and substitute something sustaining instead; salmon salad, say, or stewed sardines.

While I was slopping around in the midst of my soup, so to speak, somebody threw the bombshell that spoiled the whole evening for me. It was in the form of an unstudied remark, a chance com-

ment, falling lightly amid a general flutter and sputter of consommé consumption.

"I'm impatient to get through dinner"—I think it was Miss Keats who spoke—"so we can run on out to the Witching Hour Club for an hour or two's dancing before we start for Lookout Point. We can eat when we come back—"

So-ho, we were barely beginning to get started with the evening's orgy, were we? Likewise the evening's expenditures of hard-earned coin of the realm. Dancing at the Witching Hour Club pavilion, then a drive to Lookout Point—a much-lauded view-place where people with money to burn went to see the moon rise in the Mystic Hills—and after that, more eats.

The later you feed the more it costs, too; and we'd be lucky if we made it around that circle by midnight. The cost of automobile hire alone would be—it was here that I lost my appetite for food.

'Tis a sad sight to see a strong man turn away unheeding from viands that would tempt the palate of old Epigastrium himself.

There was an outburst of enthusiastic indorsement from those present, all except yours unhappily.

"Oh, I so adoah dawncing," gurgled Miss Duckworth liquidly, and with the proper Southern accent, over her soup-spoon. Mrs. Hyphenate-Robertson ardently opined that the thought of seeing the fair orb Luna rising chastely over the mysterious nooks and crannies of the untamed hills made her maudlin. I silently agreed with her. Honk spoke up glibly.

"The moon rises to-night at 11.37 o'clock," he reported. "We'll have a couple of hours to devote to tripping the light fantastic toe."

And he laughed immoderately at his own originality. Originality! Gadzooks! The expression "tripping the light fantastic toe" was one that convulsed the loafers who looked on and brayed with enjoyment when burning Sappho danced on the Isles of Greece. And that was a good many years ago if it was a day.

But the stinging-nettle under their flowers of speech was their attitude of heedlessness, of utter disregard for expenses. It radiated from these people. Even Honk was unaccountably possessed by a grinning imp of profligacy—Honk, who has always been an outspoken advocate of safety first.

As the meal progressed his spirits seemed to rise proportionately as mine fell. He seemed bitten by a silly bug. Antiquated anecdotes, quips, jests, and merry persiflage gushed from him. He even essayed a clumsy pun or two, to the delight of the feminine contingent.

I began to wonder if the waiter hadn't slipped a spike in his grape-juice by mistake. Nobody had put any Lethean draft in *my* lemonade, however.

I grew glummer. With appetite cloyed I toyed with my viands. I was glad when the final round of coffee and toothpicks was served.

Chattering like a bevy of sparrows—with one exception—our party fluttered out, to embark once more in Williams's five-cents-a-minute Juggernaut. I could see where my cherished savings were going to be steam-rollered into the dust of bygone memories in a few hours more, by Crœsus!

On the way to the clubhouse we had another twenty-minute flat, and fifteen minutes' worth of dirt-under-the-pin-valve. A black mood of bitterness settled over me. Hitherto I had joined sedately in the frivolity, but now I became resentful, quarrelsome, sarcastic, spitefully ironical to Miss Dixie—I mean Miss Duckworth.

And then I cast a few aspersions on the hog and alfalfa business, as well as certain folks with an affectation for the double-jointed style of surname. In short, I exerted myself to be deliberately disagreeable. And after one or two had tried to answer back, only to get gaffed more painfully on the barbed spear of my contumely, they favored me with disdainful sniffs and a panoramic view of cold shoulders.

Whereupon I engaged Foghorn Williams in a loud gabfest regarding the baseball outlook for next year.

The Keats girl gave me a dab to the chaperon as we were trooping into the clubhouse. I think she meant for me to hear her.

"Oh," she said, "*isn't* Mr. Simpson's fat friend tiresome? I know Beatrice—" meaning the Duckworth person, I took it —"must be simply bored to death."

That made me furiously angry. I decided then and there to cut the whole kit. Anybody that wanted to blow their hard-earned coin on such snips had my permission, but personally I had more than enough to tide me over the entire winter.

To merely walk off and leave them wouldn't do. Honk's questions, followed by the inevitable recriminations, were to be considered. No, I must be more subtle.

Ah-h—sail ho! In other words, ship ahoy! I would become suddenly stricken with a violent attack of something so I'd have to be sent home. A vertigo, or an apoplexy, or partial paralysis would be just the thing to divorce me from this wild orgy of blowing money. And the sooner the cheaper for me.

I chose the grand staircase for my stunt. I would groan, grab at the air, and ricochet down-stairs like a beefer steer — like Chas. Chaplin does it, or the funny farmer guy used to do it in Busy Izzy. I made haste to begin.

My first move or two was an artistic success. I moaned s e p u l c h r a l l y, clutched a couple of handfuls of empty air, and began my volplane for the lower floor. But I must 've misjudged a high step or something, for all at once the air seemed full of exploding rockets and shooting stars mingled with a sound such as the trap-drummer makes when a troop of cowboys are racing across a plowed field in the movies.

What seemed to be the rhythmic rocking of a boat adrift on a moonlit sea roused me presently. I was just being floated into a large, shiny, vanlike motor-vehicle on a sort of canvas raft steered by two sailors clad in white duck.

Two other passengers got in at the same time. Rather pompous men they were, and they seemed to be discussing me in a bored way.

"A slight concussion, eh, doctor?" said No. 1.

"H-m, possibly, doctor," conceded No. 2. "With perhaps a trifling nervous shock, but nothing at all serious, I'm sure."

O-ho! I knew both of them now. They were Drs. Neatscarver and Highfee, Valhalla's most expensive medical practitioners. I sat up.

I MUST'VE MISJUDGED A HIGH STEP OR SOMETHING.

"Ah," they said in unison. "You're feeling better."

"I'm never feeling any other way," I said a little bruskly.

"An excellent indication," commented Dr. Highfee to his friend. "Shows a resumption of normal coordination of the cerebellum with the tonsorial ganglia interrelated with the sciatica and the posterior infusoria—" or that's what I thought he said.

Dr. Neatscarver nodded sagely and replied in the same language, only more so.

Alas and alack. My Yuletide tale is all but done.

I got out unassisted at the Medicine House, and paid the carriage charges on the spot, out of my poor little evanescent, Christmas nest-egg. I wanted it over with—at the worst I felt that I had escaped even greater expenditures—

But I had only sidestepped Scylla to collide with Charybdis. The ambulance outfit said out-of-town calls were always ten dollars, and the two medical prognosticators nonchalantly mentioned five dollars each for services rendered. I paid 'em all.

I fled indoors and made a hasty inspection to see if I still had my watch and cuff-links. I felt rather flattened out with my evening.

But it remained for Honk to hand me the final shock of the whole affair when he returned tired but jaunty from his excursion, for apparently he'd seen the thing out.

"Of course," he said, "when the doctors assured us that you weren't seriously hurt by falling down-stairs, we went on with our trip as planned. I knew you wouldn't care. I'm only sorry you couldn't 've gone with us. We had a jolly time, and a rattling good supper at the Silver Grill-Room when we got back."

"Well, how much does my part of the expense amount to?" I asked wearily. "I'll give you a promissory note—"

"Why, Horace, old scout," Honk said genially, "I forgot to tell you about that part of it. The whole splurge was on Taylor, you know. Of course he's engaged to Miss Keats, and they'd planned this little party before he was unexpectedly called out of town. So he just slipped me fifty bucks, and told me to spare no effort or expense to give Doris and her friend a good time—"

TRAVELIN'.

BY PAUL STEELE.

WHETHER you're snug in a Pullman chair, with trouble swept off the deck,
Or underslung 'neath a car of sheep, with the cinders rasping your neck,
Or maybe twirling the brake-wheels as you're splitting the whistling air,
Yours is the bliss of motion, boy, for you're on your way somewhere.

MAYBE your hand is holding tight on the neck of the Johnson bar,
Or you shovel the hog to glory with a whiz like a rocketing star,
Or the braky has flung you kiting—and you're rolling the bank for fair;
Yours is the zest of living, boy, for you're on your way somewhere.

UPWARD we climb, a striving toward a beckoning, mocking glow:
Downward we shoot to valleys dim that we left long years ago:
And all of the scheme is *motion*, boy; so what do you reck or care?
For yours is the joy of *living;* yes, and the living leads somewhere!

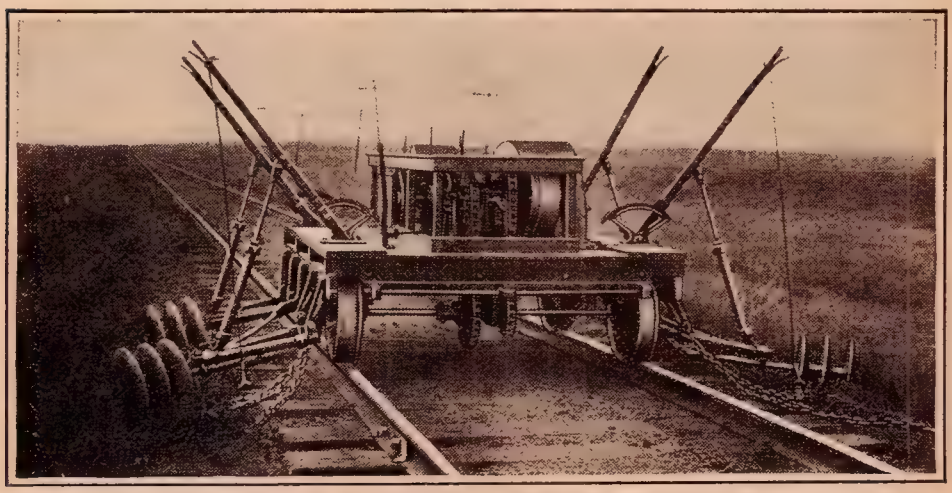
RAILWAY ROAD-BED MACHINES.

NEW POWER-DRIVEN MOWER ADAPTABLE FOR USE ON VARIOUS TYPES OF RAILROAD EMBANKMENTS. OPERATING POWER IS FURNISHED BY AN INTERNAL COMBUSTION MOTOR.

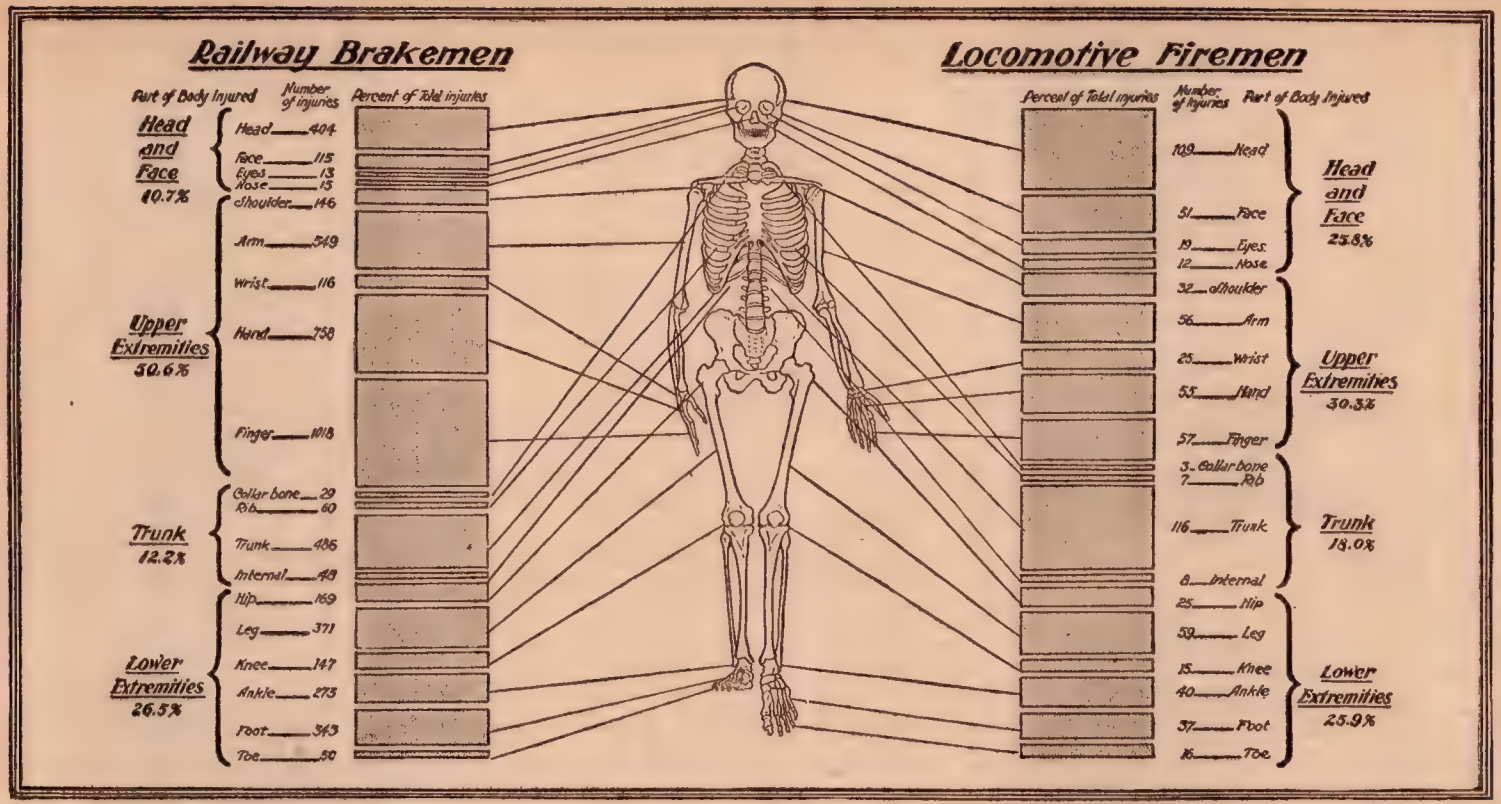
QUICK leveling and clearing of the sides of road-beds may be accomplished with two novel machines invented by Thomas McGee, Madison, South Dakota.

The machines resemble each other in that each is operated from both sides of the truck; each truck is driven by an internal combustion engine, and the operating parts of both the disker and the mower is adjustably supported. This fact makes it possible to operate on embankments having varying inclines at a different pitch, and also at varying distances from the track.

The mower (No. 1,158,702) clears away grass, weeds, and brush; and the disker (No. 1,158,701) tears out the roots of weeds and smooths and levels the surface of the embankment. Each machine does the work of twenty-five or thirty men at a low cost, and when operating can be run at a speed of three or four miles an hour, using a 6 h.-p. gas engine.



THE DISKER, SHOWN ABOVE, CAN BE OPERATED AT DIFFERENT ANGLES, OWING TO ITS ADJUSTABLE ARM-SUPPORTING FEATURE. THE ACTION OF THE DISKS SMOOTHS OUT DEPRESSIONS IN THE SIDES OF TRACK EMBANKMENTS, GIVING THEM A NEAT, LEVEL APPEARANCE AND REDUCING THE FIRE HAZARD.



LINES LEADING FROM FIGURES TO VARIOUS PARTS OF THE SKELETON INDICATE WHAT PARTS OF THE BODY ARE MOST LIABLE TO INJURY IN TWO BRANCHES OF TRAIN-SERVICE. IF A BRAKEMAN GETS HURT, THE CHANCES ARE MORE THAN EVEN THAT THE INJURY WILL AFFECT HIS ARM EXTREMITIES, WHILE IN THE CASE OF THE FIREMAN, THE HEAD, FACE, AND TRUNK ARE MOST EXPOSED TO DANGER. THIS DIAGRAM WAS PREPARED BY THE PRUDENTIAL INSURANCE COMPANY OF AMERICA. SEE OPPOSITE PAGE FOR EXPLANATORY TEXT.

R. R. INDUSTRIAL ACCIDENTS.

Brakemen Are Most Liable to Injuries of the Arm and Hand, Firemen to Those of Head and Trunk.

BY HARRY HODGINS.

LOOK out for your hands, arms, fingers, wrists, and shoulders, Mr. Railway Brakeman!

More than half of the chances of accident in your work are directed toward your arm extremities, as against your whole body.

Look out for your head and trunk, Mr. Locomotive Fireman!

In your business the chance of injury to your head and face are more than 25 per cent of your anatomy, while there are eighteen chances out of a hundred that you will be hurt somewhere on the trunk.

Warning Is Based on Statistics.

The actuaries of the accident insurance companies make a scientific study of accidents to railroad men in order that the rates of insurance covering the various units of the human system may be computed.

According to the figures of the Prudential Insurance Company of America, taken from the aggregate of non-fatal accidents to railroad men over the period of years from 1888 to 1911 in the State of New Jersey, the most vulnerable points of brakemen and firemen are as stated above. The statistics are graphically illustrated by the chart on the opposite page.

It is to be expected, of course, that the brakeman's fingers and arms should be the points of greatest danger because of the peculiar exposure called for in the work, but it is rather surprising, considering the footwork required, that in 13 years, in New Jersey, 1,018 fingers should have been lost to 50 toes, 758 hands lost to 343 feet, and 549 arms injured to 371 legs.

The upper extremities of firemen are 20 per cent safer than those of brakemen. Whereas the brakeman suffers only 10.7 per cent of injuries to the head and face, the fireman is liable to injuries above the neck amounting to 25.8 per cent of all accidents.

The eyes of brakemen are injured less than half as often as those of firemen.

While firemen sustain more leg injuries than brakemen, the order is reversed in the matter of hurt knees. It is to be wondered why this is so.

Here Are the Cold Figures.

The insurance figures are as follows: Railway brakemen—head and face injuries, 10.7 per cent; upper extremities, 50.6 per cent; trunk, 12.2 per cent; lower extremities, 26.5 per cent.

Locomotive firemen—head and face injuries, 25.8 per cent; upper extremities, 30.3 per cent; trunk, 18 per cent; lower extremities, 25.9 per cent.

When a man knows what part of his system is the favorite target for industrial accidents, he may be in a better position to ward off the blows—forewarned is forearmed.

Arms, Mr. Brakeman!

Head and trunk, Mr. Fireman!

THE CLANNISH OPERATOR.

Telegraphers Stick Together Like Burs Because of a Common Interest in a Unique Profession.

BY DONALD McNICOL.

Friendship is not a plant of hasty growth;
Though planted in esteem's deep fixed soil,
The gradual culture of kind intercourse
Must bring it to perfection.

THERE is an old saw which declares, "Birds of a feather flock together." I believe it safely may be said that telegraphers the world over, as a class, are more clannish than are the members of any other profession. Captain Kidd and his select crew, or Robin Hood and his industrious companions never were more closely cemented into a social entity than to-day are the scions of Morse.

"Once an operator, always an operator," is a truism which is attested in many ways and on many occasions. There is on record an experience of a railroad president, a former telegrapher, who, while hurrying through a depot to keep an appointment at a directors' meeting, heard a telegraph-sounder ringing with the music produced in it by an expert sender somewhere on the line.

Oblivious of his important engagement, the magnate succumbed to the magic of the wires, and for half an hour listened to the beautifully modulated cadences of the dots and dashes reproduced in the clear, bell-like tones of the sounder. Only when the unsuspecting operator ceased sending did the president of the road come down from the quiring spheres.

Immediately realizing that now he was thirty minutes late for the meeting, he hurried onward, intently absorbed in formulating an excuse for his tardiness more acceptable than the truth would have been.

There is a recent experience of Thomas A. Edison at the San Francisco Exposition. Mr. Edison journeyed from New York to the Pacific coast to be the honored guest of the exposition authorities.

Many elaborate plans were made for his entertainment, and there was a record crowd in attendance at the exposition on Edison Day. During the afternoon, while debating over a choice of festivities, Mr. Edison learned that two hundred telegraphers were gathered in an auditorium near by holding a Morse-fest.

Edison's "Happiest Evening."

In a moment his mind was made up and he was on his way to get among the knights of the key—his friends of old. Mr. Edison afterward stated that the evening thus spent was the happiest he had experienced in years.

On another recent occasion the call of the sounder brought together a number of the nation's mightiest men of affairs at the annual dinner in New York of the Ohio Society. The president of the Ohio Society, Mr. Charles P. Bruch—himself a former telegrapher—was aware of the fact that a number of the most prominent members of the society, who are now prosperous captains of industry, were, in their youth, telegraphers; so he had set aside for these men a special table equipped

with keys and sounders properly connected.

The innovation was greatly appreciated by the former brass-pounders, and as each one tried out his hand, it was observed that not one of them had any other idea than that he could put it through the repeaters to beat McClintic or Brickhouse.

Incidents such as these constantly recurring, emphasize the fact that the art of telegraphy is one in which its devotees always take pride and never wholly wander away from.

Surrounded Himself with Ex-Operators.

Walter P. Phillips, that estimable old-time telegrapher, at one time general manager of the United Press, upon leaving the telegraph business to enter the news-gathering field, recruited his ranks from the pick of men employed in telegraphy. Later, when Mr. Phillips entered mercantile pursuits, he took with him a large number of men who had been expert telegraphers, all of whom, in devotion to the new work, repaid him well for his loyalty and confidence.

Operators have one great advantage over the members of other callings, in that their intercourse is not local or restricted to community groups. Consider the case of an operator employed in Montreal who, on a day in January, arrives at the office in the morning, and, after shaking the snowflakes from his overcoat, removes his fur cap and overshoes, and then sits in at his desk where, for eight or nine hours, he works directly with an operator in New Orleans clad in white-duck trousers and tennis shoes.

Picture, if you can, the unique daily experience of two telegraphers saying, "Good morning," one of them sitting in an office in Halifax while his *vis-à-vis* is situated by an open window in an office in Bermuda.

On wires worked direct between New York and San Francisco, day operators manning wires in New York at 8 A.M., an hour later hear their Frisco mates asking for relieving operators so that they may go to lunch, as, due to the difference in time between these two points, it is then twelve o'clock in San Francisco.

The universality of working conditions has always made it possible for a competent telegrapher to travel over the country, and in any part of the United States, Canada, or Mexico obtain employment without delay and at good wages. Those operators who have not at least once made the rounds are hard to find.

There may have been times when the migratory telegrapher has caused managers to consign the whole tribe to the unhappy borders of limbo, but the demand for good men generally has been active enough to make traveling comfortable. Of course, the majority of these men ultimately settle down in a favorite office, and become pillars of integrity in their neighborhood.

It is during the years of roving that life-long friendships are formed—friendships enveloped in all the subtle charm of romance and adventure. Where is the telegrapher who, in a reminiscent mood, cannot unfold many a tale of the cattle country, the plains of the West, or recite daredevil exploits in Memphis and San Antone?

"Voices of the Wire."

An operator working nights in a railroad lonely depot in Wyoming or Saskatchewan soon cultivates the uncanny sense of being able to distinguish between the voices of the wire. I never knew an operator who did not carry in memory the recollection of some other man's "sending."

To the uninitiated the ticking sounder babbles but one harsh, unintelligible song, while the trained ear of the expert telegrapher recognizes many different styles of Morse sending. It is a common experience for an operator to remember another man's sending long after the sender's name has faded from memory.

The fact that these things are true explains why telegraphers, in carrying on their share of the world's work, constitute

a natural universal brotherhood, whose members have common experiences, common aims, and common hopes.

There are in existence a large number of telegraphers' societies, some having social aims only, some of them historical, others organized for technical study, and a large number of associations, widely scattered, providing life insurance and financial aid in case of sickness.

Some of the Telegraphers' Societies.

The Old-Time Telegraphers' and Historical Association, organized in the year 1880, has among its members a large number of prominent ex-telegraphers, as well as a majority of the old-timers still engaged in the business. The association holds a convention annually, the attendance always being very large. The qualifications for membership are:

"Any person in good standing, who, prior to twenty-five years before the date of making application, was employed in the telegraph service, and thereafter for five years, shall, upon payment of two dollars (an initiation fee of one dollar and one dollar dues) be eligible for membership." Mr. Andrew Carnegie is the present president of the association.

Another "old-timer" organization is the Society of the United States Military Telegraph Corps, whose members served as telegraphers in the Northern armies during the war between the States. Three of the operators who served in the War Department office in Washington under President Lincoln and Secretary Stanton still are active members of the corps—namely, David Homer Bates, Albert B. Chandler, and Charles A. Tinker.

Among the social organizations, the more prominent are the Magnetic Club, New York; the Morse Club, New York, and the Dot and Dash Club, Philadelphia. The Magnetic Club is composed of officials and employees of the Postal Telegraph-Cable Company.

At the spring and fall dinners given by this club each year, more than two hundred members are in attendance. The Morse Club is composed of Western Union Telegraph officials and employees.

On the Pacific coast, the Western Association of Old-Time Telegraphers holds periodical gatherings at Spokane, Washington, Seattle, or Tacoma.

Insurance and Aid Organizations, Too.

Of the national insurance and aid societies, the largest are: The Gold and Stock Life Insurance Association, which has been a successful telegraphers' organization since the year 1876; the Serial Building Loan and Saving Institution, organized in the year 1886; the Telegraph and Telephone Life Insurance Association (formerly the Telegraphers' Mutual Benefit Association), and the New York Telegraphers' Aid Society.

The Order of Railroad Telegraphers has been in existence since the year 1884. The Commercial Telegraphers' Union has in its membership operators employed with the commercial telegraph companies and with newspaper and brokerage houses.

Both of the latter organizations publish monthly magazines.

THE ROUND-HOUSE FOREMAN SAYS:

YOUTH, like pie, is found at the top of the pail; but it is well to save it.

BOOMER JONES.

BY J. W. EARP.

At the Lecture on the Transportation of Explosives He Instructs the Instructor.

"IN the year that this bureau was instituted, there were 14,564 people either killed or injured in the handling of explosives while transporting them. In the year just passed not a death has been reported, and only two injuries recorded. I leave it to any of you if this is not indeed a record to be proud of?"

The speaker paused for a moment to wipe the perspiration from his brow and to refresh himself with a glass of water before resuming. The Boomer borrowed the "makings" from the student, settled back on his shoulder-blades, took two or three big "inhales," and remarked:

"That's the soundest stuff I ever heard one of those Whistling Williams peddle out. If we had had a man like him over on the old Kano, I would have been working there to-day."

"How was that?" asked the student.

Before the Boomer could launch the story, the lecturer was busy explaining what explosives could and could not be loaded together in the same car. The Boomer yelled in the student's ear that he would tell him about it some other time.

Finally the lecturer finished. He then asked the crowd to please answer the questions he was going to ask, as by this method he hoped to ascertain how much of the facts they had absorbed from his lecture.

"Mr. Connor, what is the first thing a man should do when opening a car that contains gasoline or other highly inflammable substances?"

"Always leave the door open for a few minutes before you enter, so that the fumes, if there are any, can escape," replied Connor.

"How about at night time, Mr. Jones?"

"Do the same stunt," responded the Boomer promptly. "Never go into a car with a lighted lantern or a pipe until the car is well aired. I remember the time that Pete Foley pulls a bonehead like that, and he won't forget about it very soon. Take it from me, he got a lesson he'll remember the rest of his life!

"Pete and I are braking partners on the local at the time, and we drive up to a town named Rankin, where we had to unload fourteen barrels of gasoline. Pete breaks the seals, and without saying anything to anybody, slides the door open and hops inside.

"Before you could say 'Skat!' Pete comes sailing out of that car with his lantern doing the highball act, and his clothes are all on fire. The way Pete sailed through that door was like a rabbit leaving a hollow log with two ounces of No. 10 shot in close proximity to his abbreviated appendage. The only difference you could make between the two is that the rabbit is scared out and Pete is blowed out.

"PETE COMES SAILING OUT OF THAT CAR WITH HIS LANTERN DOING THE HIGH-BALL ACT AND HIS CLOTHES ARE ALL ON FIRE."

"The only thing that saved Pete from serious injury is that he lands in the water-barrel that stood at the corner of the depot and puts out the fire. But at that, Pete is minus eye-winkers for a couple of months, and has to wear blinders so as to keep the cinders out of his eyes.

"We take the car three miles to a water-tank and put out the fire. The conductor turns in a report that for briefness hasn't ever been equaled on the C. C. and S. He says on the report:

> "Broken barrel of gasoline; Peter Foley (student green) jumps in, blown out; car gone up the spout. From
>
> "Yours truly,
>
> "MIKE MCSTEEN."

There was a laugh from all when the Boomer finished the tale.

"And that same thing is liable to happen to any of us," said the lecturer. "We must bear in mind that the safest way is the best way."

"Right you are, mate," said the Boomer, looking for a match, as his cigarette had gone out while he was telling about Peter Foley's adventure with gasoline.

"What would you think of a man that would load common matches in the same car with gunpowder?" asked the lecturer of the Boomer.

"I'd think he was a manufacturer," replied the Boomer.

"Of what?"

"Stiffs for the undertaker, souls for St. Peter, and toothpicks for the section-gang."

"You have the right idea, Mr. Jones. It would show poor judgment, would it not?"

"I wouldn't call it judgment; I'd call it suicide for the men that had to handle it in a train."

"Of course. And it should never be done. Remember that."

"Never fear," grinned the Boomer.

"What about handling gas-tanks, Mr. Hennesy?"

"Great care should be used in handling them."

"Why? Mr. Jones, you may answer that question."

"'Cause they're liable to blow up if you drop one. I remember the time that Bill Gordon threw one out of a car and it exploded. It blew the awning off the depot, and filled the conductor so full of steel it took two doctors and a magnet to get all of that tank out of his system."

The men snorted their unbelief at this tale of the Boomer's, but the lecturer declared that it was possible, whereupon the men relapsed into silence.

"I see that you have had much experience in the handling of explosives," said the lecturer to the Boomer, with a smile upon his face as he added:

"Haven't you?"

"Sure have!" agreed the Boomer. "But the funniest thing was the time I was on the east end local out of Puttong on the S. A. That was some local, be-

lieve me; and we always had something like thirty pedlers along, with twenty-some-odd short loads every day each way over the road.

"One summer the boes were extra heavy on the traveling stunt on account of a big wheat crop in Kansas awaiting to be harvested, and we are putting out free transportation to them, which makes them all eager to ride the S. A.

"So this day we put out of Poline with the usual package of pedlers and such stuff, along with about forty-five of the heftiest hoboes you ever took a look at. To make them think they are earning their ride, we put them to unloading the merchandise at the stations, along with all the extra heavy stuff like binders, mowing-machines, fly-wheels, and the like. I'll bet that we furnished every farmer in that country a binder or a mowing-machine that summer.

"Well, we are going right along on the advertised all the time, and the O. R. C. is tickled to death over the boes helping us out with the work so much that he says that they can ride back with him when the harvest is over and it sha'n't cost them a cent. But of course there was bound to be bad luck somewhere when we are doing so nicely on that trip, and it happens when one of the hoboes drops a tank of this laughing-gas that the dentists give you before they pull a tooth.

"Say! The dentists could have pulled the legs off those boes and they wouldn't have cared; that is, after they got a whiff of the gas fumes. We are between station when this happens, and I am perched out on top of the car, while all the boes are inside. The first I know they begin laughing fit to kill, and I suppose some one has started a crap game in there to pass the time away.

"The way they laughed and kept on laughing made me think, too, that one of 'em must have made about fifteen straight licks with the bones.

"When we get ready to work at the next station, the boes aren't able to work on account of the gas making them laugh so hard that they can't lift anything. We had to do all the work ourselves, and when we got through we high-balled off, leaving those boes rolling over and over in the dust back of the station and acting like they were having a fit. That was my first and only experience with the gas stuff."

"That is rather remarkable," mused the lecturer. "I don't think I ever heard its equal."

"You will if you listen to him very much," voiced a fireman in a low tone to the engineer at his side.

"Ain't it the truth?" said the engineer.

"What is the highest explosive known?" asked the lecturer.

"Dynamite," butted in the Boomer, without waiting to be called upon.

"But we do not call it dynamite when we bill it. What do we call it?"

"High explosives," said the student.

"Is that correct?"

The lecturer put the question to the Boomer, who allowed it was, and added:

"They don't make anything any higher that I know of. Over on the T. B. V., I used to know an engineer by the name of James, who had been in so many head-end collisions that he had bought a stick of dynamite and had it stuck on the draw-bar over the pilot of the engine.

"He said that the next guy that tried to smoke in on short time and kissed him on the main line had better have his seat in the Pearly Kingdom already reserved, because he would be needing it two seconds after they met. He said he was getting tired doing the loop the loop from an engine making forty-five per just to accommodate some throttle-puller who imagines that he is showing class by smoking in against him.

"Well, sir, when this gets noised around among the hogheads, it makes them all sit up and take notice. After that they always gave James a wide berth. And when they were called to go out on a run, the first thing they would do is to check the register and see where James was at. If he wasn't on the road

anywhere, they would figure that they were due for the smoking stunt.

"I catch James one afternoon on a hot-shot merchandise run. We had thirty cars and a great big 900-class engine to do the biz with, and we are all happy. When we are going through Dipseld Cut we are making a good forty per, and I am dreaming on the seat-box.

"All at once Barney sticks his head out and looks at something ahead of us on the track. I come out of the trance and take a look with him.

"There on the track is a big Hereford cow, and she is zigzagging back and forth on the track, looking for a place to get in the clear. She could have stood lengthwise and cleared all O. K., but it seems she stands sidewise to be contrary, or else she doesn't tumble to the fact that to stand lengthwise is the only way. So what does that fool cow do but jump right out in the middle of the track and try to outrun us.

"Talk about your rear-end collisions! When I came to I have an engine-wheel around my neck and a ton of coal on my chest, and that same cow is licking my face with her tongue. The fireman is still holding on to his scoop, and with a dazed look on his face is looking for the fire-door along the clay bank in that there cut.

"I wiggle through the spokes of the wheel and go looking for James. When I find him, he is just coming back to earth, and he raises up on his elbow and says in a faint tone:

"'They didn't have any flag out!'

"Right then I tell a hogger what I think of a man that will carry dynamite on an engine in defiance to all the rules and regulations of the transportation department. But that stunt broke Barney of the dynamite habit so completely that he never has tried it again, and they still smoke in on the old T. B. V."

"Police!" yelled the fireman.

"Help!" cried the switchman weakly.

"One more dream and I'll whip John D.!" added the student.

"And they told me this was a dry town!" from the engineer.

"Shut up!" growled the Boomer. To the student:

"Slip me the papers and some long green. I want to show you a trick."

"Please don't," begged the fireman with tragedy in his voice.

The student only grinned as he passed the outfit to the Boomer.

"What care should be taken in the handling of fusees?" asked the lecturer of Hennesy.

Hennesy couldn't think of the answer, so the question was passed to Jones.

"Be careful how you light them, where you light them, how you throw them, where you throw them, and where you put them. But I saw something done with fusees the other night that I never saw before, and to my recollection skins any stunt I have ever witnessed anywhere, any time.

"We were trying to load forty cars of Western horses the other night down at the stockyards, and you can take it from me we weren't having much luck in getting those horses in the car. The broncs would walk up the chute to the car-door, then turn around and run back.

"They kept this up for an hour and a half until our patience is about gone, and we still haven't got one car loaded yet. Then the student gets an idea and says:

"'I think I've thought of a way to get them in the car.'

"'Kid,' says the O. R. C., as he mops his shiny noodle with a piece of waste, 'if you can pull the stunt, I'll make a brakeman out of you, or die trying.'

"And what does that student do but beat it for the crummy. Five minutes later he is back with an armload of fusees, which he proceeds to pass out along with the details of the scheme. We all line up behind the broncs with the fusees in our hands. They eye us suspiciously, but don't even guess what we are going to do until the student yells:

"'Let 'em go!'

"When we cracked those fusees and begin to wave them over our heads, at the same time yelling like a bunch of Sioux Indians on the warpath, things begin to happen. The way those broncs went up the chute and into the car was a caution to speeders.

"They weren't satisfied with just going into the car, but want to go on through the other side of the car. It took us exactly forty-five minutes and twenty fusees to load that forty cars of plugs. But I suppose you think that is a fairy tale, don't you?"

No one answered the Boomer, for the simple reason that it was an actual fact, and they knew it. The Boomer, seeing there was no chance for an argument, settled down in his seat, and the lecturer went on:

"Now, in the case of acids. I cannot impress upon your minds the urgent need of the most careful handling of them, both as to loading, unloading, and storing them in the cars. Nitric acid is inflammable. Muriatic, sulfuric, and many other acids will only char whatever they come in contact with."

"I'll bet that was what was the matter with Henry Brewer the time we dropped a jug of something or other one day when we were on the local together," said the Boomer. "I remember Henry got some of it on his shoes, and in less than an hour Henry hasn't any shoes. I have to do all the work that day, because Henry's feet are so tender that they won't stand the wear and tear of the cinders while trying to switch box cars. Don't you think so, Mr. Lecturer?"

"Undoubtedly," answered the lecturer. "These acids will eat into flesh as well as clothing, if given a chance. So do be careful."

The men nodded. Turning to another subject, the lecturer asked:

"Should fireworks be boxed up again—that is, supposing they should be in a box that is unable to keep them, and they are scattered about the car as a result of a damaged carrier—what should be done with them?"

"They should be boxed up, and not allowed to remain loose on the floor or anywhere else in the car," replied the Boomer. "I remember the time I was braking for Harry Janes on the Nowata local. It was just before the Fourth of July, and the fireworks that we were handling ran into the tons. One of the boxes gets busted up, and fireworks are scattered all over the car floor.

"There are bombs, serpents, skyrockets, Roman candles, pinwheels, and other things in this assortment I never did see before bound for Tender.

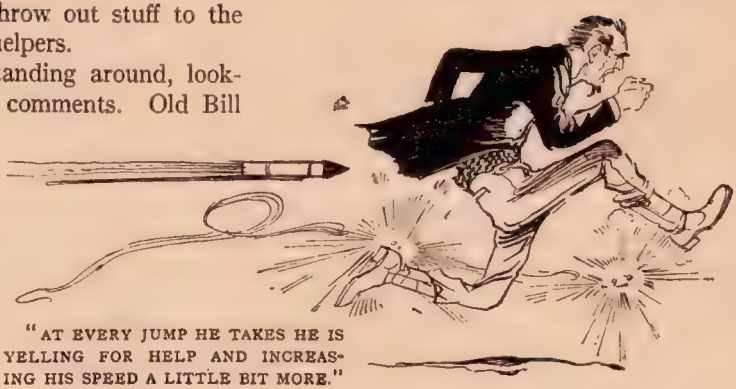
"Jimmy Doyle is my partner, and there is a student in the swing that day. Jimmy has one bad habit of throwing cigar ashes around careless like, and I warn him a dozen times or more that day to try and be careful.

"Everybody is working like dogs, and the conductor is doing his laps the same as the shacks when we stop at Benton to do the work. All of us hop into the

"WHEN I COME TO I HAVE AN ENGINE-WHEEL AROUND MY NECK, A TON OF COAL ON MY CHEST AND THAT SAME COW IS LICKING MY FACE WITH HER TONGUE."

car, and begin to throw out stuff to the agent and his two helpers.

"Old Bill was standing around, looking on and making comments. Old Bill is crippled up with rheumatism, and hasn't hit a lick of work for three years, so he passes the time away by coming down to the depot to see the trains come in.



"AT EVERY JUMP HE TAKES HE IS YELLING FOR HELP AND INCREASING HIS SPEED A LITTLE BIT MORE."

"I am working close to the door, piling the stuff high and dry on the sill. The conductor and the student are in the rear of the car, while Jimmy is trying to budge a barrel of vinegar in the other end where the fireworks are.

"Jimmy grunts and tries to move the barrel, but she won't move. He flips the ashes from his cigar over into the fireworks and gives another heave on the barrel of vinegar.

"Then there was the dog-gondest explosion you ever saw, and a big skyrocket whizzes past my ear, and Jimmy at the same time throws that barrel of vinegar right up to the door where I am standing. I let out a yell, and jump to one side as Jimmy comes flying toward me and starts climbing over the merchandise so he can get outside.

"A big skyrocket sails up under his jacket and explodes with a report like a cannon. Jimmy loses his jacket and his presence of mind, at the same time he dives through the door with a can of condensed cream in one hand and a sack of flour in the other.

"I follow him as quick as I can. So do the rest of the crew; and when the student came out it was in a perfect rain of fireworks. One of the bombs whips through the door and sings by Bill's ear. Bill ducks like an old leaguer in the batter's box who is waiting for a base on balls.

"The bomb hits a farm-wagon and explodes like forty cannons at the same time, which makes the two mules hitched to the wagon kick the dashboard down, throw the wagon against the building, jerk loose, and go up the street in a cloud of dust.

"Just as they start to run, another bomb comes sailing out and hits Bill just below the belt. Bill gives one yelp, throws his cane away, and goes up the street with the mules.

"At every jump he takes he is yelling for help and increasing his speed a little bit more. Doc Andrews told me the next day that when they went by his place Bill was leading the race by a neck, with the mules a close second.

"The Roman candles shoot the window-lights out of the depot and a serpent gets after Snow, the agent's dog. Snow takes one look at the serpent, which is chasing itself around his tail; then, with an expression of surprise on his face, he begins to sift the sand between his tootsie-wootsies and joins old Bill and the mules in the race for life.

"The agent turns in the fire-alarm, and a few minutes after they arrived it was all over but the work. Jimmy is scared pretty bad, but it turns out he isn't hurt any; neither is the student nor the captain.

"As for myself, I am feeling a little weak around the knees, but outside of that I am still in the ring. One good thing that stunt did was to cure Bill of his rheumatism, and to this day he has never had another attack of it."

"Well, well!" ejaculated the lecturer. "That was some experience with fireworks. But it only brings out more forcibly the point I am trying to make you see: The necessity of being careful when handling explosives.

"Now, as it is almost five o'clock, we will quit for the day. And I want to thank each and every one of you for the interest displayed in this lecture.

"I also want to thank Mr. Jones for his telling of his experiences with explosives, as it has given me many a good idea to work out by which I can do even better work in the future on this subject. Mr. Jones can rest assured that this will be reported to the superintendent, and I am going to recommend that they give him ten merit marks as a reward for his help in this matter. Good day!"

The crowd filed through the door as the lecturer left the desk and made ready to depart. The Boomer for the 'steenth time that day borrowed the student's makings and observed:

"That's the best time I've ever had in an examination car. If all the guys were like him, we'd learn something useful. I'd like to take an exam. from him every day. Wouldn't you?"

"Sure!" agreed the student, and turned the conversation by getting the Boomer to tell him how to chain up a car that has a continuous drawbar connection.

CARS! CARS! MORE CARS!

INCESSANT is the cry for more cars, ever more cars.

Shippers who bitterly complain of car-shortage are not aware of the fact that the railroads are building more cars than ever before and still they are unable to meet the demands of the public.

The latest statistics given out by the census sharps at Washington show that steam passenger-cars built in 1914 doubled the number built in 1909.

At the present time, according to the latest figures, the railroads and electric lines of the country are constructing 138,178 cars a year, at a cost of more than $165,000,000.

These figures include the totals for 118 railroad repair-shops, which reported the construction of 11,049 new cars, and seven establishments engaged primarily in other lines of manufacture, but which produced 4,481 railway cars as subsidiary products.

The number of electric cars represented in these totals is only 2,821, valued at $10,000,000, the increase being small. The great increasing demand is for steam-railroad cars.

The percentages of increase in the demand for passenger-coaches is very high, and, of course, their value is remarkably increased because the modern principle of building them calls for the best of material and the finest construction, especially where steel is used.

Following are the figures, from the latest statistical reports on file at Washington: Annual total production of steam cars, 138,178, worth $155,029,539; number of passenger-cars, 3,588, worth $45,029,539; freight and other cars, 131,799, valued at $110,002,456.

The figures throw into bold relief the progress in the matter of passenger-car building. Whereas in 1909 passenger-cars were costing, on the average, about $8,500, they are now costing, on the average, in excess of $12,650.

With the Inventors

A READER has asked us the profound question, "Why is a patent?"

At first, we were inclined to place the question on the siding, and then we smiled editorially and gave it right-of-way with the throttle wide open. It is a good question and one which every inventor should put to himself and try to answer without prejudice.

Why am I patenting this invention?

Is it just a little bit better or a little worse than existing patents?

Why is this patent?

What is the reason for its existence and is the reason sufficient?

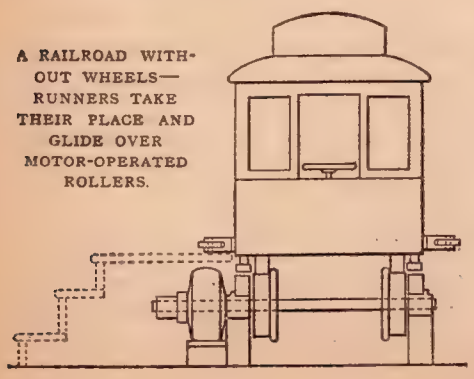
There are few men who can criticise their own work with a calm, impartial mind. The average man gazes at the results of his own efforts through tinted glasses and with looks of admiration, and he sees millions of dollars where none exist and where losses only will occur.

Until a man can subject his own work to a clear analysis and an unbiased judgment, it would be better for him to stay away from the patent office, except to look at the other people's patents.

TRAINS WITHOUT WHEELS.

A COMPLETE system of transportation has been invented, elaborated and patented, whereby runners take the place of wheels and glide over motor-operated rollers located at short intervals along the roadway. At each station, stopping and starting a train are attended to by the train-despatcher, but at intermediate points the same functions can be performed by a motorman if desired.

As all trains run at approximately the same speed, collisions are unlikely. Automatic devices stop a train at a station if the despatcher neglects to do so, and by the same means the train ahead is put in motion before the rear train can enter the station.



A RAILROAD WITHOUT WHEELS—RUNNERS TAKE THEIR PLACE AND GLIDE OVER MOTOR-OPERATED ROLLERS.

A feature of the invention consists in utilizing the energy developed by a train running downgrade under the force of gravity. Such a train or car increases the speed of the rollers, causing their motors to run as generators and give current back into the line instead of taking current from the line.

In this way much of the energy lost on an up-grade can be recovered in the descent, while at the same time the resistance of the motors, operating as generators, serves as an efficient brake.

In a somewhat similar manner, the energy usually wasted in stopping a train can be partly recovered. This is accomplished by having the rollers at the approach to a station run at successively diminishing speeds.

The momentum of the oncoming train accelerates the speeds of the rollers and the attached motors, making the latter operate as generators, as in the preceding instance.

The patent is No. 1,198,605, and is granted to Walter E. Trent of Reno, Nevada.

CAR-LIGHTING CONTROL.

PASSENGERS languidly reclining in a well-cushioned parlor car, contentedly reading their favorite magazines by the soft glow of electric light through frosted glassware of delicate design, seldom pause to consider the wonderful system back of that illumination. The many necessary inventions, the intricate

devices for control and regulation, and the long years of patient experiment and toil that preceded installation, are given but a passing thought, but are none the less realities.

We enjoy lamplight that our forefathers only read about, in the prophetic pages of their favorite magazines. Modern illumination approaches daylight as a limit—or passes the limit, as some assert.

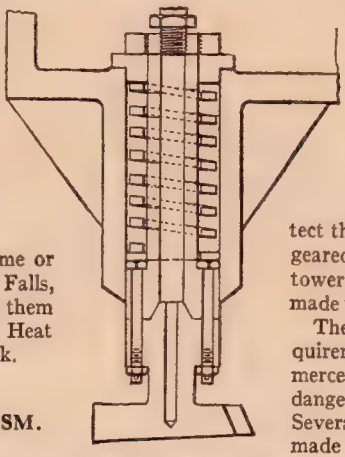
Patent specifications, Nos. 1,197,159 to 1,197,162, inclusive, cover an elaborate method of controlling the generation and distribution of current in a car-lighting system, including a counter electromotive-force device, a variable resistance in the generator field circuit, for the purpose of varying the output, and a specially devised means of regulating the resistance.

The system is of particular interest to electrical engineers and car-builders, and is worth a careful study.

The patents are all in the name or William A. Turbane, Niagara Falls, New York, who has assigned them to the United States Light and Heat Corporation, Niagara, New York.

NEW VALVE MECHANISM.

LONG ago, when the old-fashioned slide-valves were operated by hand, a youth sat one day trying to think of a way to perform his work with less exertion, just as youths today try to think out schemes to make their labors less arduous or their studies less exacting. Finally the young man noticed that the valve-rod and the fly-wheel moved at precisely the same speed, and he conceived the idea of connecting these two parts.



NEW SLIDE-VALVE RESEMBLES THE WALKING-BEAM OF THE OLD SIDE-WHEELER. LEVER ARM IS PIVOTED IN THE CENTER AND HAS ATTACHED TO ITS SLOTTED ENDS STEMS THAT OPERATE THE STEAM-VALVES.

He succeeded in carrying out his plan, and had the satisfaction of seeing the engine operate automatically, even though his employer did accuse him of being lazy.

Although the same general principle of thus connecting the valve-rod maintains to-day, there have been various modifications of the slide-valve itself. A recent invention resembles the walking-beam of the old side-wheeler.

A lever arm is pivoted in the center and has attached to its slotted ends stems that operate the steam-valves. When one end of the lever rises, the steam-port is uncovered and admits steam to the engine's cylinder, while the descending valve uncovers the exhaust and closes the steam-port.

The device is applicable to either stationary engines or locomotives. The patent is No. 1,199,693, owned in part by Charles R. Hall of Drifton, Pennsylvania, who assigns one-third to P. J. Boyle of Hazelton, Pennsylvania.

SAFETY DEVICE STOPS TRAINS.

A SAFETY appliance for stopping a train when a block signal is displayed is being perfected by the Rev. Thomas J. Glynn of Beaver Falls, Pennsylvania. It comprises a movable arm at the side of the track, engaging a lever on the locomotive and operating the air-brakes.

The movable arm is so inclined that the impact of the locomotive lever is gradual, thus guarding against breakage from the initial shock, while suitable shock-absorbers protect the brake-levers. The apparatus is geared by an endless chain to the tower motor, and by this means is made to operate with the tower signals.

The device conforms to the requirements of the Interstate Commerce Commission in displaying a danger signal when out of order. Several practical tests have been made and have given satisfaction.

Quite a number of safety appliances have been based on the same general idea embodied in this invention, but as yet none seems to be very extensively applied in practise.

FOG-BELLS AND SUCH.

AN inventor proposes a tower fog-bell in regions where fog trouble occurs, and no doubt the idea is excellent, even if it does remind one of beating surf, with the lighthouse keeper's daughter gazing wistfully across the waves. Some one suggests that a dinner-bell would be equally effective, which takes the sentiment out of the story.

Another effective invention consists of contacts at the side of the track near a signal tower, which lead a current on board a passing locomotive to ring a bell when a block signal is set against a train. Such an appliance would seem to be simple and inexpensive and well worthy of careful development.

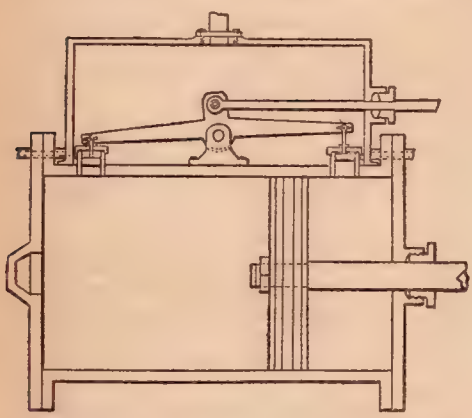
Still another device, constructed on somewhat similar lines, leads a current aboard a locomotive, but instead of ringing a bell the charged wires "contact with said engineer's feet." Said current produces a tickling sensation in said

engineer's feet, which is proportional to said voltage.

Far be it from us to discourage inventors in this important field of work, but if the locomotive engineers get all that is being invented for them they will be a very wide-awake set of men.

SAFETY PLUNGER.

THIS device is not a complete safety appliance in itself, but is intended to receive the initial blow from a lever placed at the side of the track for the purpose of operating the brakes



SAFETY PLUNGER RECEIVES THE INITIAL BLOW FROM A LEVER PLACED AT THE SIDE OF THE TRACK FOR THE PURPOSE OF OPERATING THE BRAKES AND STOPPING THE TRAIN.

and stopping a train. The plunger works against a stout spring designed to act as a shock-absorber, and can be used with various makes of brake-operating apparatus.

An ingenious feature is that if the initial impact is sufficient to break the device, the breakage will occur at a particular place, in the weakest portion of the narrow neck, and as the interior of this neck is connected with the air-supply the air will be released and the brakes applied.

The patent is No. 1,199,643, granted to Jean F. Webb, Jr., of New York, assignor to the International Signal Company, Inc., New York, New York.

TELEGRAPH SYSTEMS.

IMPROVEMENTS, or at least changes, in telegraph apparatus and methods continue to multiply from week to week, and it would require many more pages than we have at our disposal, if we were to give even an outline of the construction and operation. Any one who may be interested in the subject, however, will find valuable study in the pages of the patent specifications referred to below.

Patents Nos. 1,193,217 and 1,193,218 relate to an automatic printing-telegraph system, including transmitting and receiving apparatus. On the receiving end, each letter is built up by the imprint of more than one piece of type, separately actuated.

The inventor is Charles G. Ashley of Chicago, who has assigned his invention to the General Engineering and Construction Company, Limited, of Toronto, Canada.

Patent No. 1,199,011 is also a printing-telegraph, in which the characters are transmitted by successive electric impulses of varied polarity and a system of selective relays in local circuits. Charles L. Krum and Howard L. Krum of Chicago are assignors to the Morkrum Company, Chicago, a corporation of Maine.

Patent No. 1,199,262, by John Gell of London, England, is a transmission system whereby a message may be impressed upon the line at a comparatively high speed and then divided and parts of the message switched into separate receiving instruments at the will of the transmitting operator.

COMPOUNDING-VALVE.

A COMPOUND locomotive being one in which certain cylinders are operated with the exhaust steam from the other cylinders, it can be readily understood that at a standstill there is no exhaust steam for use and that ordinarily the low-pressure cylinders must be idle at the start, until the high-pressure pistons have advanced sufficiently to open the exhaust ports.

In other words, just at the very instant when a maximum of energy is needed to get up momentum, a minimum amount of energy is ordinarily available. In the case of a compound freight engine starting a heavy train the difficulty would assume importance, and it was to meet just such a contingency that the compounding-valve was invented.

By its operation, live steam is admitted to all of the cylinders at the start, but afterward, when sufficient headway has been gained, the valve shifts automatically and compounding takes place, the exhaust steam being switched to the low-pressure cylinders.

The patent is No. 1,199,615, and is known in official phraseology as an "intercepting and reducing-valve for compound locomotives." The inventors are John S. Keen and Kenneth Rushton, both of whom are connected with Baldwin Locomotive Works, Mr. Rushton in the capacity of chief mechanical engineer. Their invention is an important contribution to locomotive construction.

RAILROADING FROM BOOKS.

First Appointee to Harvard's Hill Chair of Transportation Says Good Executives Can Be Trained in Schools.

BY THOMAS W. BRIGGS.

CAN a man learn to be a railroader in college?

Or will only the hard knocks accumulated on the long climb up the ladder of experience make a man efficient in this branch of industry?

Professor W. J. Cunningham, now occupying the Chair of Transportation at Harvard, recently established to commemorate the work of the late James J. Hill, declares that in this day of specialization good railroad men can be turned out of college from boys who have never counted ties under a blistering sun, stoked a smoky engine, or sold or punched a ticket.

A Graduate from School of Hard Knocks.

Professor Cunningham got his own experience through hard knocks on railroads, starting life as a clerk in the passenger department of the Canadian Pacific Railroad at St. John, New Brunswick.

"The old school of railroad management," he said, after his appointment to the Hill chair, "believed that railroading could not be taught. Modern managements believe that it can be taught to advantage, both to the employee and the employer.

"Fifteen years ago the college man was not wanted by the railroads. The railroads now are looking for men who are specialists in the technique of the business, and these men may receive their education in college.

"The courses offered to students fit them to become railroad men with a solid foundation of fact and a broad understanding which cannot be looked for in the beginner who is engrossed by the importance of the particular work of one

PROF. W. J. CUNNINGHAM.

THE HILL PROFESSOR OF TRANSPORTATION, LIKE THE EMPIRE-BUILDER HIMSELF, WAS BORN IN CANADA.

department. A college graduate may be expected to possess the true perspective as a result of his study. Hence the rise of such men should be rapid, providing they have the stuff in them that makes railroad men.

"Railroad operation is highly specialized departmentally. It offers little opportunity to the average man to gain information concerning the work of other departments. Many a good man has been wasted through misplacement.

Can Fit Men for Staff Positions.

"At the present time we believe that we can train men for positions in which a knowledge of railroad statistics and ability to analyze them count most. We can probably graduate men better fitted for staff positions, by which I mean men trained to advise and assist vice-presidents and managers. As a matter of fact, we could place many men in such positions to-day if we had them.

"There is an increasing demand for men of special knowledge in the railroad work.

"The ultimate opportunities in the line positions are as great as, or even greater than, in the staff positions. A man may have to start lower in a line position, but his rise should be much more rapid. He will have to plunge into the work and learn how men are handled, and perhaps he will feel that his special knowledge is lying dormant, but in time it will tell.

"If I should condense briefly the reasons why the present railroad managements are looking for college-trained men, whereas their predecessors had no use for them, I would say: The narrowing rate of return on railroad investments has made necessary more intensive work and improved methods of operation, intended to reduce cost and increase efficiency. It follows that the man with the proper mental training will fit into this new era of railroad management easily and naturally."

The late James J. Hill was a firm believer in the doctrine that colleges should produce railroad workers, his reasoning being that effective management is based on facts and not guesswork, and that the place to get facts is in a university.

When seventy-four friends of Mr. Hill contributed $125,000 for the endowment of a professorship in transportation at Harvard, he became interested and added $125,000 to the endowment. Professor Cunningham spent three months under the tutelage of the "empire-builder."

The many positions which Professor Cunningham has filled on other lines, as well as his connection with the Hill roads, have given him a broad experience and wide vision. Born in 1875 at St. John, New Brunswick, Professor Cunningham entered railway work in 1892 with the Canadian Pacific as stenographer and ticket-clerk.

Prof. Cunningham's Varied Career.

He then successively filled positions as clerk with the Boston and Albany, statistical clerk to the general manager of the New York, New Haven and Hartford, and assistant chief clerk to the general superintendent of the Delaware, Lackawanna and Western. In 1907 he became associated with J. H. Hustis, who was then assistant general manager of the Boston and Albany, as statistician; and coincident with his chief's election to a New Haven vice-presidency he was appointed vice-president's assistant. When Mr. Hustis was later elected president of the Boston and Maine, Professor Cunningham followed as president's assistant.

Professor Cunningham has been connected with the Harvard Business School ever since its establishment in 1908, first as lecturer on railroad operation and later as assistant professor of transportation, holding these positions in conjunction with his railroad work.

Professor Cunningham has made special studies of the British and Prussian-Hessian railways. His research work in this country included studies of the Harriman, Santa Fe and Frisco lines.

ANOTHER TICKET SWINDLE.

Railroad Was Badly Stuck by Clever Pair, But Same Game Can Never Be Played Again.

BY FRANK M. O'BRIEN.

SMITH and Jones were two crooks; perhaps they are crooks yet. They decided to gouge a slice of cash out of a railroad company.

Both went separately to a railroad ticket-office in New York. Jones bought a ticket to Albany. Smith bought a ticket to Chicago, and, as many traveling men do, got a receipt for it.

The two crooks boarded the same train, but did not sit together. When the conductor came along, Jones presented the ticket to Chicago which Smith had bought. Smith presented the ticket to Albany which Jones had bought.

Smith and Jones Switch Tickets.

At Albany, Jones, with the Chicago ticket in his pocket, got off the train. His part in the game was ended.

West of Albany the conductor, remembering Smith as a man who had given up a ticket to Albany, asked him how far he was going, preparatory to colecting more fare. Smith replied, with a surprised look, that he was going to Chicago.

"You gave me a ticket to Albany," said the conductor.

"Railroads should retire faithful conductors before their eyes become weak," said Smith. "Is it necessary for me to remark again that I gave you a ticket to Chicago?"

The conductor considered that it was necessary; also necessary that Smith pay his fare for every mile he traveled west of Albany. Smith replied without heat, but with all the sarcasm he could command. It was his business to enrage the conductor, if possible, without getting into a fury himself.

At the next station the conductor ordered Smith from the train, and when Smith coolly refused to go the conductor called the trainman and together they put Smith off. Smith made a tussle, but only such as many an honest man might put up under honest circumstances.

It appeared to the men in the neighboring seats that here was a passenger getting the worst of it. What they thought was of importance to Smith, because he had employed the time between New York and Albany finding out their names, businesses and addresses.

Smith sued the railroad for $25,000, and his lawyer snapped in the face of the railroad attorney Smith's receipt showing that he had bought a ticket from New York to Chicago.

Road Bilked Out of $2,500.

The railroad settled with Smith for $2,500. Its lawyers had a hunch that Smith was a crook, but Smith had the evidence with which to win the suit.

After the settlement was paid over the railroad lawyer said:

"Be a sport, now, and tell us how you pulled that off."

So Smith told them, and now, say the railroads, nobody will ever put that particular trick over on them again.

On what basis Smith split the loot with Jones was not announced.

The Sunny Side of the Track

NERVOUS Employer: "Thomas, I wish you wouldn't whistle at your work."

Office-Boy: "I ain't working, sir; I'm only whistling."—*Interborough Bulletin.*

A CANADIAN judge, traveling by rail, observed a man looking about for a seat, and kindly invited the man into his own compartment.

"Now, Pat," said the judge, "this is a splendid country, isn't it? Beats old Ireland to sticks, doesn't it?"

"Oh, no, sir," said Pat; "there's few places that can beat Ireland."

"Come now, I am sure in Ireland it would be a long time before you could travel with a judge."

"That's true, sir," said Pat. "But in Ireland it would be a long time till they'd make you a judge."—*Railroad Telegrapher.*

IT was little Elsie's first experience riding in a sleeper.

"Mother," said she tremulously.

"Hush, darling," whispered the mother, "you will waken the others."

"But, mother, I only wanted to ask one question."

"What is it, dear?"

"Who has the flat above us?"—*Harper's Magazine.*

LADY: "And you say you are an educated man?"

Weary Will: "Yes, mum, I'm a roads scholar."—*University of Michigan Gargoyle.*

"PORTER, this berth has been slept in!"

"No, sah; I assuah you, sah. Merely occupied. It's the one over the wheels, sah."—*Puck.*

THE train it is a wicked thing,
The engine smokes all day,
And drags along the chew-chew cars,
And tanks up by the way.

—*Exchange.*

OLD Lady: "I feel a presentiment that something is going to happen on this journey. Do you think there is any danger?"

Statistic Fiend: "Every passenger on this train takes one chance in 1,903,421 of being killed."

Old Lady: "Goodness! If they had told me that when I bought my ticket, I wouldn't have come by this line."—*Express Gazette.*

HE stood and looked at the steam-roller that was working on the asphalt in the San Francisco exposition. "Great thing, ain't it?" said a bystander. "Great nothing," was the reply; "you must be powerful slow in California when that's all the speed you can make. Why, out in Pine Center they'd shoot an engineer that couldn't go no faster'n that!"—*Railway and Locomotive Engineering.*

A MAN was appointed detective for a railroad company, and he showed his authority at every opportunity. While riding in a coach one day, he heard a little boy behind him sniffling.

The detective turned to him and said: "Have you a pocket handkerchief, my little man?"

The boy replied: "Yes, sir; but mamma said I shouldn't loan it to everybody."—*Christian Herald.*

WHEN Alton Michael Packward asked the porter of the Great Southern at Gulfport, Mississippi: "Is that the Gulf of Mexico?" the porter replied:

"Only a portion of it, sir."—*Exchange.*

INQUISITIVE Party (on train): "Ye'll likely be gaun tae Ellie?"

Non-commissioned Officer: "No!"

Inquisitive Party: "Then ye'll be gaun tae Pittenweem?"

N. C. O.: "No!!"

Inquisitive Party: "Then ye'll share tae be gaun tae Crail?"

N. C. O.: "No!!!"

Inquisitive Party: "Dae ye think Ah care whaur ye're gaun?"—*Punch.*

PIERRETTE: "What was Mrs. T. Smith-Hulligan supposed to represent?"

Pierrot: "Judging from that long, trailing split skirt she had on, I should say an observation-train."—*Life.*

Help for Men Who Help Themselves

NUMBER 77.

THE STORY OF THE PASSENGER-TRAIN.

BY CLAUDE WASHINGTON.

IN FIVE PARTS. PART FOUR—YOUR HEALTH AND COMFORT.

AS you speed along to your destination, your safety in the hands of an army of wideawake men, your speed at once promise and fulfilment, your mind free from any care except that which concerns your comfort, you are lapped about with four matters of much concern to others about which you never think — unless something happens to you.

You expect a train to be clean and sanitary. You have a right to expect it, for you have paid for first-class transportation, and to an American first-class means only the best.

Unless you are taken ill upon a train, or shortly after a journey sicken with some disease which you promptly blame upon the berth, you have small thought to give to the care taken that you may leave a car as healthy as when you entered it.

You expect a train to be well ventilated. You hardly expect to go through a journey without having either too much or too little air at some time, for you know that long tunnels mean a tight car, and prefer to suffer from bad air rather than bad smoke.

You Want Air, Despite Cranks' Protests.

You also expect to travel occasionally with a crank who wants all the air outdoors brought into the car, or that other crank who regards one extra spoonful of fresh air as worse than battle, murder, and sudden death! But, in spite of cranks and tunnels, you do expect to have enough air—good, clean, fresh air—to enable you to keep a clear head and a comfortable body, and if you don't get it, behold, you quickly join the crank class and kick.

You expect to be as cool in summer as it is humanly possible to be, and as warm on the coldest day in winter as if you were in your own home or in a high-priced hotel. Moreover, you expect this heat to be supplied you in safety.

Should you meet a car-stove in a modern train you would regard it much as you would a pterodactyl or an icthyosau-

rus on Broadway, and be about as wrathy with the road which dared go back to such an antiquated means of keeping you warm as you would be on the diner if yesterday's bread or strong butter were set before you.

Finally, you expect to have light, safe light and plenty of it. You not only expect electric lights, but brilliant light; you have been taught that it is not necessary to lay down your book when the shadows of evening gather about your speeding train, and that even when an unenviable destiny puts you to bed in the living grave of a lower berth, it is no longer necessary for you to wind yourself into your sheet in darkness.

Sanitation, ventilation, heating, and lighting are thus four matters which concern you very nearly, and which engage the attention of the road which caters to your comfort and your well-being almost as much as do those other matters of speed, promptness, and bodily safety.

First-Class Trains Start Trip Clean.

If you have traveled on "jerkwater" roads, or been obliged to go into a day-coach on a branch line, or have journeyed to the backwoods where your fellow passengers were a different race of people from your own, you have seen, perhaps, a dirty car and found it very unattractive. On no modern train, in no modern first-class carriage, have you ever seen dirt at the beginning of a journey.

That is because at every terminal a small army of cleaners is as much concerned in giving you freedom from dirt as is the ash-pit boy in giving your engineer a clean fire, or the master mechanic in having your express pulled by an engine thoroughly in order.

When you leave your car at the end of its run, it will be taken to the cleaning-yard, a part of the big collection of tracks on which cars are shifted, stored, and kept, where various mechanical devices are available for its renovation.

Here hundreds of cars will be cleaned every day; one road of but medium size keeps three hundred and fifty cars in its cleaning-yard, and thinks nothing of renovating eight thousand cars a month. There will be a general foreman, who knows more about dirt and its hiding-places than the best of housewives; a couple of assistant foremen, and from one to two hundred cleaners, men and women together.

Carpets Come Up First.

The first thing that happens is the taking up of the carpets. Sanitarians are agreed that no railway car should have a carpet, and that a rubber-tiling floor with removable rugs would be far more sanitary. But it is extremely difficult to disabuse a traveling American of certain ideas of luxury.

There was a howl when the new steel cars and their beautiful and strictly sanitary plainness began to replace the ornate carvings, the heavy draperies, and the gold embellishments of the mid-Victorian sleeper. Here, however, was something the man in the car could see; a steel car didn't break into splinters and stick into him when there was a wreck. As steel did not lend itself to carvings, he accepted it as a fact, and now thinks anything else a fit subject for ridicule.

But his carpets are different. He cannot see the germs which lie in wait for him in a carpet. And besides: "They clean 'em, don't they? A carpetless car is cold and unhomelike—"

So we have carpets!

The foreman and his cohorts do their best. The carpets are taken up and the car thoroughly swept, not with a broom, but with a blast of compressed air, which roots dirt out from under seats and from behind pipes and out of corners.

Plush Is Germy but Durable.

Next comes a thorough scrubbing of the floor, the while vacuum cleaners are at work on the chairs or berth-seats, if it is a sleeping-car. Not until the vacuum cleaner came into being were the plush seats ever clean; not even the compressed

air-blast could accomplish such a miracle as that.

And plush, in one form or another, is practically the only material available for chairs and seats. Although plush is about the least sanitary covering one could imagine, it is more durable even than leather, if not half so clean.

But we won't have leather, we who travel, for a good and sufficient reason. Leather, if you please, is *cold,* and we'd rather have invisible germs than chill, any day! Other and more sanitary coverings will not wear, and the railroad must have chairs that wear, otherwise it could not afford a lot of other luxuries.

Hence the vacuum cleaner, which sucks out all the dirt and probably half the germs, and makes the plush seat as sanitary as anything less than sterilization can make it, is a real boon, though we never give it a thought.

The carpets, of course, have their own cleaning, sometimes by a forced draft of air, sometimes by sucking air through with a vacuum cleaner. The woodwork —or steelwork—of the car is wiped down and polished, and even the outside of the car is washed, oiled, and rubbed.

Sacrifices Made to Appearances.

The modern railroad knows well the value of appearances, and knows, too, that no matter how dirty the train may look when it comes in, when it leaves it must be spick and span and like new, or some passenger will sometimes take a rival road. Even the trucks and underrigging are brushed off with oil and made glistening and clean to the eye, though the thin film of oil is in itself a dust-collector as soon as the train gets in motion.

All this seems to the traveler on a modern train as a matter of little moment. Yet the cleaning and fumigation of a car may cost as much as ten dollars, if it is a Pullman and very dirty. Two dollars a sleeping-car is an average price.

A dining-car costs less to clean, for while there is more furniture, and therefore more handwork, there is less upholstery. Even the baggage-car costs a quarter for its cleaning.

A road which cleans four hundred cars a day at an average price of a dollar a car, has a cleaning expense alone, not counting special cleanings and disinfectings, which will run to a hundred and twenty thousand dollars a year!

It is, however, in the other sanitary arrangements that the biggest expense comes, and where, indeed, a still larger expense is to come in the future.

Periodical Disinfection.

Sleeping and passenger-cars are subjected to a periodical disinfection, the interval between depending on the behests of the sanitary engineer—which office is a vital part of most modern roads—and also upon the presence of a passenger with a disease which is " under the ban," discovered after he has inhabited the car.

Smallpox, diphtheria, pneumonia, are some of these ailments; alas that our happy-go-lucky traveling-public doesn't raise the same barrier to influenza, grippe, colds, and the rest of the minor ills which live even in the best-cleaned passenger-car!

Disinfection is most often a formaldehyde process, in which seats are taken from their places, bedding separated, carpets lifted, doors to closets left open, and sheets hung from the bell-cord. Formaldehyde — that evil-smelling, powerful liquid which is so rough on germs—is then liberally sprinkled around, with care that it touch no woodwork, and the car closed up for four or five hours.

An airing completes the " cure," and the car is again ready for use. This, or some kindred measure acceptable to the local board of health in the city where the cleaning is done, will insure your safety should you again take this car for a journey, but unless you have seen it done, the probabilities are that you never knew that the safety of your health was as carefully guarded by your railroad as the safety of your train from collision or accident.

Ask the conductor next time he stops to chat with you. If he is an enthusiast he will expatiate upon the sanitation of his car. But if he is honest, he will tell you that, careful as they are, the railroads do not yet safeguard your health with *every* known means.

"Oh, yes, our present practises are an infinite improvement over what used to be," he will say, "but there is some room for betterment even yet. We no longer have the public drinking-glass, even where State laws permit. Our modern toilet arrangements on Pullmans are beyond reproach, at least from the passengers' standpoint.

"But our sanitary engineer has tests with germ cultures which prove that there are few articles woven on a loom which hold more different varieties of disease than a berth curtain. He is agitating for white, washable ones all the time.

Public Not Fussy About Bedding.

"If you came into a chair-car and found a chair without a clean linen headrest, you'd see the owner of that chair put up a kick! He won't rest his head except on his own clean napkin. But he comes into my sleeper, gets freshly laundered sheets and pillow-cases, a presumably clean mattress and pillows, and sleeps under blankets which are of such a color that they look clean no matter what their real condition may be!

"The community towel went out from sleeping-cars long ago, but the community brush and comb remain. The car-builder puts a door to Sam's linen-closet, but a curtain to the smoking-compartment and dressing-room. That dark-green curtain is touched by a thousand hands in a week, and I bet it would yield a culture which would stagger the bacteriologist's microscope!

"We still have the carpet, the plush, Sam's little brush to disturb the dirt and make you passengers breathe it, the wooden pillow-box under the seat, the long berth-curtain instead of two short sets, which would give more air-space when the uppers are not occupied, and we still have somewhat crude arrangements for cleanliness of our persons after a night in our berths! The road does a lot, but, if you travelers will howl a little, will do more!"

Sanitary Officer Has Many Duties.

But all these things of which the conductor speaks are coming. Hardly a road to-day of any passenger-traffic pretensions but has its sanitary officer who is charged with a general supervision of the health of its passengers. He ranges from the cook's pantry on the diner to the porter's linen-closet, and not one of him but is recommending all these reforms as hard as he can, and unquestionably he will succeed in time.

Meanwhile, do you who travel be happy in the disinfection, the daily cleaning, the laundry, and the ventilation which make for your health and comfort.

We did not always have ventilation. We do not always have it now, for the matter of that, unless we travel in a car which is of the newer type.

For there is always the old lady wrapped in a fur coat and a blanket, to whom half an inch of window is worse than a dose of cyanid, and suffering old ladies must have their way though the rest of us die of suffocation. However, there are systems of car ventilation which do not depend upon open windows which can offend the fresh-air-phobians, and these are the ones which serve you best.

Stop and think about it a moment. Sniff at the air you breathe.

You haven't thought about it, because it hasn't obtruded itself upon you—but the air in your car is good, isn't it? It is good because you have a really ventilated car, not one "permitted" to have a little air at the whim of Sam, the porter.

Winchell Devised First Ventilation.

The history of car-ventilation is interesting, but too lengthy to do more than indicate here. Probably the first real ventilation system other than that of oc-

casionally opened windows and doors which the first cars inherited from the horse-drawn stage-coach, was the Winchell system.

In this, an open hood at each end of the car took in air with the motion of the train, allowed it to run through the car and diffuse itself as it might, to pass out under the rear hood. Loud protests from those passengers who were so placed as to receive the down draft from the front open hood reduced the size of the intake so that only from seven to ten thousand cubic feet of fresh air were admitted under favorable conditions in an hour.

This amount is totally inadequate for a filled car, every occupant of which requires at least a thousand cubic feet an hour.

Enter the Spear Coal-Stove System.

In an attempt to improve the most obvious defects of this system, improper diffusion, lack of quantity, and the admittance of only cold air, especially objectionable in freezing weather, the Spear coal-stove system came into use. In this arrangement, hoods or intakes at diagonal corners of the car were connected with the stoves, so that the incoming air passed down around the outside of the stove-pipe, about the stove, and from thence into a ventilation box running along each side of the car.

Various openings in this ventilation box allowed the air to enter the car, rise through it, and go out the deck ventilators at the top.

Though a big improvement over the Winchell system, this stove idea also had objectionable features. It worked the wrong way when the car was standing still, shooting forth warm air and drawing in cold.

It also produced a rarefied atmosphere within the car, which sucked in cold air at every crevice. Attempts to improve it by substituting steam-pipes for the stove, adding special extra hoods and changing the deck ventilators, still further improved it, but it has been almost entirely superseded by more up-to-date systems. A great majority of cars to-day are ventilated entirely with some arrangement of the deck-sash system; that is, the little windows at the top of the car looking out on the roof or deck. For many years it was thought that as hot air rises and cold air falls, the deck-sash ventilators would both take in new air and get rid of old, merely by a control of the angles at which they were opened.

While it is true that opening the deck-sashes will speedily cool an overheated car in winter, showing a complete interchange of air, the down drafts are extremely uncomfortable and dangerous for passengers.

The newer Garland Ventilator system, which creates a vigorous exhaust out through the deck-sashes, has seemed to be a greater improvement.

But any deck-sash ventilation system, whether of the so-called "automatic" type, in which deflectors outside the sashes are supposed to shoot in the air from the movement of the train, and shoot out the vitiated air, are necessarily limited in their capacity to the size of the deck-sashes, and even screening does not entirely eliminate smoke and cinders. Moreover, the deck-sash system completely divorces the heating and the ventilation systems, and this is not always a good plan.

Pennsy Solved the Puzzle.

Perhaps the most satisfactory ventilation system is that developed by the Pennsylvania, standard on that road, and used by many others, in more or less modified form. In this system, as in most car-ventilation systems, the movement of the train through the air is depended upon to supply the motive power.

Hoods located at diagonal corners of the car admit air, as in the older systems. But instead of permitting that air to go directly into the car, it is led down through vertical boxing to a horizontal duct beneath the car, running its whole length.

Through slots in the floor and the duct, the fresh air from this airway is admitted into a steam-pipe duct running the length of the car along its sides. Through galvanized pipes the air passes from this warming duct into the car itself, entering the car under each seat.

From here it passes through the car, and up and finally out the globe ventilators in the center of the upper deck.

So ample are the ducts and so effective the forced draft, that sixty thousand cubic feet of air an hour on a normally moving train are easily furnished by this arrangement. Moreover, when steam is turned into the pipes, the air is made to move on the familiar principle of hot air rising while cold falls, and tests have shown that even without the motion of the train, upwards of twenty thousand feet of fresh air per hour can be supplied by this system in winter.

A valve in the intake pipe shuts off the system when going through a tunnel, and of course a hopper to catch and retain all cinders that get through the wire screening in the ventilators is provided.

Hard to Ventilate Pullmans.

The question of ventilating a Pullman has never been solved to the satisfaction either of the company or the traveling public. Too much air and not enough heat in the upper berths, too much heat and not enough air in the lower berths, are the usual complaints in winter, when an open window in the little space of a lower means an uncomfortable chill.

But most of the complaints of lack of ventilation in a Pullman come from the occupants of standing rather than moving cars, which has led to some experiments with forced drafts, fans, and power ventilation which may in time bring a greater measure of relief than the Garland Ventilator system, or deck aspirator can ever give.

For the Pullman problem is entirely different from that of the day-coach or even the chair-car. The few passengers in the Pullman require less air than the crowd in a day-coach. The double windows, invariable vestibules, double doors, and narrow passages at each end of the car, make the Pullman almost an air-tight chamber.

The aspirator-ventilator idea, which sucks out bad air with a motion-created draft, thus rarefies the air in a Pullman with the result that any voluntary opening results in a miniature whirlwind. The involuntary openings, cracks, interstices, *et cetera*, are not sufficient to admit enough air to supply that exhausted.

Hence that car which we consider to represent the last word in railroad luxury, is, in some ways, the least satisfactory in its ventilation, although conditions in the new steel cars are so infinitely better than in the older wooden ones that even the crank thinks twice before he complains.

Car-Heating a Science in Itself.

Car-heating has become a science in itself. Gone is the car-stove, save on very primitive roads, and gone the horrors of the car-fire when disaster overtook a train. This generation hears little of such tales, but old travelers know, from reading if not from experience, that the ax and saw in the glass case at one end of the car were not placed there for a gruesome reminder of the possibilities, but to save life when the car-stove set a ditched train on fire.

To-day we not only travel in steel cars which cannot burn, but we have our heating almost entirely accomplished by steam or hot water or a combination of both, which will set nothing on fire.

True, we all complain about the steam —the car is either an oven or an ice-box, and sometimes Sam will tell you confidentially that according to the passengers it is both at the same time. But at least we have no records and few complaints of Pullman or chair-car travelers who freeze, and but little evidence that even the coldest weather causes discomfort in the modern steam-heated car.

It may interest some traveler who has suffered from too much heat to know

why his car cannot be cooler. Too much heat in a car comes usually from steam-heat in mild weather.

Steam at two pounds pressure to the square inch produces a temperature of about 218 degrees in the steam-pipes. No steam gives no temperature. Steam at say forty-five pounds gives a temperature of about 290 degrees.

In cars where the only way to regulate temperature is control of the steam pressure, a car may be too hot with the least pressure possible, but too cold with none. To obviate this difficulty, hot-water heat, either with steam from the engine or a car-heater, or a selective system by which one or more lines of steam-pipes in the car can be cut from service, are used.

While the car-stove as such has disappeared, the car-heater is in common use in many trains where the equipment must be more self-contained than the Pullman or chair-car. A steam or hot-water heated car depending on the engine for warmth, is a refrigerator when disconnected; hence some means of adding to the heat or maintaining that already in the car, has to be arranged.

But the car-heater has one great fundamental difference from the car-stove, apart from its principle, which is that of heating water which circulates through the car in pipes. The ancient car-stove had to stand exposed in one end of the car in order that it might radiate heat, which was its purpose.

Heater Can't Cause a Fire.

The car-heater can be, and is, in a compartment of its own, protected from doing damage in the event of a smash-up by a metal lining to the compartment, and no more dangerous to the occupants by any possibility of its causing a fire than the flames on the boiler in the engine are dangerous to the men behind.

Modern car-heating, as far as it concerns the average traveler, is either direct or indirect; that is, steam from the engine, passing through a reducing-valve, goes through the train-pipe to circulate about the car through pipes along each side; or, steam from the engine is used to heat water, which water circulates through pipes in the cars.

The direct system has advantages of strong heat, allows emptying the pipes and storing cars cold, with the possibility of quickly putting them into service again, and the disadvantage noted of difficulty of regulating the temperature, as well as that of going cold very quickly when disconnected from the engine.

Hot-water heat is milder in its application of caloric to the air, and better suited to those classes of equipment which make up first-class trains. Hot water is also more easily arranged with a car-heater than any other type of modern heating system.

Many Special Devices, Too.

Of course there are many special heating devices, patents, curious adaptations of principles of physics, and many commercial exploitations of different varieties. All, however, are fundamentally either steam from the engine used direct, steam from the engine used to heat water, or an application of the individual heater to steam or water in the individual car.

Electric heating has been tried out, but more on electrified roads and street railways than steam railways; and with the present cost of electricity, and difficulty of proper and ample supply of current on steam trains, it can be considered as yet merely an experiment and in its infancy.

But not so with electricity in lighting. The history of car-lighting is as simple as it is remarkable. There have been few steps of any moment in its development.

First the candle, then the oil lamp, small, inefficient, dangerous, a mere aggravation of light. Next, gasoline or kerosene gas, soon followed by the Pintsch gas system, or other gas systems which were upon the same principle.

Next came explosive acetylene, and finally the electric light.

Of course, hundreds of varieties of oil lamps, and as many of gas lamps, have

been made and used; vapor lamps, liquid lamps, wickless lamps, lamps which burned with mantles and lamps which burned without—one might fill the magazine with an account of the train-lighting patents which are on file in Washington and still not come to the end.

Three Ways to Light Cars.

But to the man in the car there are now but the three—oil, gas, and electricity—and in a few years will be but two. For the oil lamp is doomed.

Even as you would consider a Pintsch-gas lighted sleeper a second-class car, and exclaim angrily at the road that dared use it on a first-class train, so does the very occasional traveler on the small branch line now object to the oil-lamp lighted car and demand at least the illumination of the gas system. And before very long nothing but electricity, the clean, the brilliant, and the safe, will be tolerated in any train anywhere on this continent.

Pintsch gas came to us from Julius Pintsch, of Germany. His invention was made in 1867. It included the use of gas made from oil rather than from coal, and would stand compression without losing its illuminating power, storage reservoirs, a regulating device to keep pressure uniform, and other such details.

It spread rapidly through Europe, which, in the first ten years of its existence, equipped over six thousand cars with it. In this country its adoption lagged, and in 1883, shortly after it had been first tried, there were less than two hundred cars so equipped.

But in ten years of growth in this country it spread amazingly, and had it not been for the progress made in electric lighting, it would undoubtedly have been the one great train-illuminator.

However, the little bulb, the storage battery, the train generator, either axle or "head end," were destined to supersede the gas system, if for no other reason than that the modern electric system was self-contained and required no constant recharging from outside tanks as does the Pintsch system.

But electric lighting did not spring full-grown into its own place. Many ideas were tried out—indeed, many are still being tried out—before a thoroughly satisfactory means of using current was devised.

As early as 1881, an English railroad system tried straight storage batteries. France tried primary bichromate batteries in 1885, but only long enough to refill the batteries once!

The Pennsy and the Boston and Albany used straight storage batteries about 1886, but gave it up as too expensive. In 1887, the Pullman company developed the first "head-end" system, followed in 1888 by the Chicago, Milwaukee and St. Paul, which developed one of the first of the present-day head-end ideas, using a separate boiler, engine, and generator in a baggage-car.

To-day we use either the head-end system or the "axle-driven" much more largely than "straight storage." In the former, a turbine engine—usually direct-connected to a generator—is run by steam from the engine.

How the Head-End System Works.

Current is led through train-wires flexibly connected to each car, all of which have their own batteries to maintain lighting when the train is cut off from the engine. The head-end system is satisfactory as long as there is plenty of steam and no lost time.

But an engineer's duty to get his train in on time is more important than to illuminate his passengers. Late, needing more steam, he gets it by cutting off the turbine, and thus illumination suffers.

For this and other reasons the axle-generator fought its way to the top. As the name indicates, a generator is connected to the axle in a truck, supplying current to the car as long as the train is in motion, and charging the batteries discharged when the car is stationary and lit, during day runs.

Because electrical apparatus was in its infancy when the experiment was first tried, the axle system did not immediately succeed. It must give the same voltage out, no matter how high the speed, it must connect and disconnect itself from the battery when used to charge that unit, without attention from any one, and the system must be so arranged that the generator may leave off and the batteries take up the work without a noticeable change in the light.

Moreover, the problem of reversal of the car must be considered, as well as a hundred mechanical problems of hanging the generator, and making it a permanent piece of machinery uninjured by the rough life it lives on a heavy car at speed.

However, all these problems were conquered, one of them—that of high voltage—being solved by the wonderful tungsten lamp, so that on the trains of to-day sixty-four volts is the common thing rather than a hundred and ten.

And whether under the shaded light of an electric candle in the diner, whether cooled by an electric fan in the smoker, whether at ease under the soft illumination of the reading-lamps in the library-car, or comfortably disrobing by the bed-lamp in the berth, it is to the storage battery, the axle generator, or the head-end system that your comfort is due, and indirectly to the genius, the stick-to-itiveness and the courage of those who were willing to overcome difficulties, solve problems, spend money, and stand discouragement from old-fashioned executives "higher up," that the American train is the best-lighted in the world.

So you, traveling onward to your destination, are hedged about not only with safety, all but guaranteed speed and promptness, but are warded from dangerous germs, sheltered from dirt, protected from disease, are warmed and made comfortable, given fresh air in plenty without draft, and lighted as you are in your own home.

Surely these things, developments of the luxury of the marvelous age in which we live, are not the least of the triumphs of that most triumphant solver of difficult problems, the American railroad.

Next month Mr. Washington will conclude this series of articles with a paper discussing "The Luxury of Travel."

VIA MORSE.

BY CHARLES L. FUNNELL.

AN express stood in the station, and beside the massive rods
The engineer was whistling as he oiled;
Then the con rushed from the office to the wielder of the can,
And he clutched a yellow message, slightly soiled.

Just a word or two he mentioned to the cheerful engineer,
And the latter grinned and grasped him by the hand.
"Guess they broke another record," said a knowing hanger-on.
"Gee, they must have hit the bends to beat the band!"

But 'twas not of bends or records that he told the engineer
To make the latter jump to share his joy;
Speed could not so light his features as he said with trembling lips:
"Old man, She's doing well, and It's a boy!"

OBSERVATIONS OF A COUNTRY STATION-AGENT.

BY J. E. SMITH.

The Home Town Is Always Proud of Its Sons, But the Home Folks' Boost Does Not Make a Railroad Man.

"YES, SIR, HENRY'S BEEN PROMOTED. YES, SIR, HENRY'S PROMOTED."

WE carry with us—each one of us, to our last days—fond recollections of the old "Home Town." With many of us there is a sheepish remembrance of the estimates and expectations that went after us when we departed for all time from its friendly shelter.

In all confidence, a great many of us are shams. We never justify the early hopes. We think of this with some reproach.

Then we think again that, after all, it was really the fault of the Home Town. It too readily overestimates its departing sons. With this I made the effort to recall and write of the ones who had gone out to enter the services of the railroads, and to note how faithfully they had lived up to Home-Town expectations.

This was suggested to me when I met an old acquaintance of the old Home Town where I had been in my youth.

The old gentleman was rather slow-witted, and had a son ditto. I recalled that his son studied telegraphing, and that after an apprenticeship of some two or three years got a job on the railroad where the heaviest work was "O.S—O.S.—O.S.-ing" trains, etc.

I remembered that he went to the job

like a doddering infant learning to walk. He wabbled and fell down, but stuck, and finally became a fixture as night operator at Lonesomehurst.

"How is Henry getting along?" I asked the father.

"Fine!" exclaimed the old gentleman with enthusiasm. "Haven't you heard about him?"

I confessed that I had not. With the war in Europe, the presidential campaign in this country, and all the automobile ads to read, Henry as an individual had small chance to come under the range of my vision.

"Why, Henry," explained the old man, "ain't night operator any more. He's promoted."

"I am glad to hear it," I put in, in mild perfunctory interest. "He has certainly earned something better. How long has he been night operator at Lonesomehurst?"

The old man grappled with this bit of mathematics in time-measurement.

"Now, let's see," pondered he. "It's nine years this comin' 9th of March. That's the month of the big flood, and Hen Doolittle's barn burned the night before."

With these memorial markers firmly established, the old man tied to them definitely and went on:

"That's it. Nine years ago this comin' March 9th. Yes, sir, Henry's been promoted."

"What did they give him?"

"They have made him day operator. Yes, sir, he's day operator. He gets five dollars a month more than he did nights."

There was a touch of pride in the old man's voice.

"Henry's doin' well. The railroad thinks an awful lot of Henry. Henry's made good with them. He's been right there all the time, where they could depend on him. Henry is one of their main standbys. Don't suppose they'd hardly get along now without Henry. All the people around here's proud the way Henry is makin' good."

Now, everything in the world is great or good or rich only by comparison. The wealthy man of the village is only a piker in the city. The sensation of a small community is only a whisper in the metropolis.

Henry was promoted. Henry was a valued employee, indispensable to the railroad. Henry was a success—for, after nine years working nights on a job as an "O.S." operator, Henry is given the day trick.

I cannot say that the movement is fast enough to take one's breath away, nor would one become dizzy watching the ascent. We who know something of railroads and railroad workers are wont to smile at the pride and the estimates placed on Henry. They are very fanciful valuations.

As a fact, in the railroad procession Henry was almost as immovable an object as the white post that says "100 miles to Chicago," but down in the Home Town they are proud of Henry.

I shall record it once more: The Home Town is always proud of its sons, no matter in what capacity they achieve distinction. The sense of pride has no special predilection. The Home Town is just as proud if it has turned out the master crook as it would be of the greatest evangelist.

Every one has a proprietary interest in the product and seeks to share a mite in the glory. This leads to exaggeration of circumstance and incident to add to the reputation and renown of the favored one.

This particularly applies to our smaller localities—to those places where we all know one another and where nothing but the first name is used. These are the places that supply the greater number of our railroad men.

No other labor-using institution is so well equipped to get the raw material in labor as the railroad. It reaches out into the country and villages and picks it off.

You busy man of the city may have often looked on the goggled engineer or the brass-buttoned conductor of the lim-

ited, or you may have glanced at the switchmen shunting cars to industries, or down a labyrinth of tracks, and it may never have occurred to you to associate these men with Holsteins and hayricks. But take it from one who thinks he knows: Over two-thirds of them have been stung by bumble-bees.

The heads of those very competent and masterful organizations that recently had your Uncle Samuel performing flip-flops were in humble origin from the smaller places. Even now back in the old Home Town they are recalling with pride all the boyhood events of Tom and Dick and Harry.

The country differs from the city in many respects. In the city they do not know you are dead until the week after. In the country they know it the week before.

All that is of no material consequence, for in the end the total is the same. Nevertheless, in the small item of personal conceit, in the country there is the memory and the will to speak a man's name. They boost for him in his achievements. They shout for him in his triumphs.

We who wander from these small places are prone to impose on the home folks. Because they are fond of speaking well of us, and take a close interest in our successes, we are disposed to overstate, to enlarge our positions, and to amplify the scope of our authority for the view of the Home-Town folks.

" Distance lends enchantment."

The Home-Town youth usually " accepts a position on the railroad." It is always better to " accept a position " than to root around for a job, even if in the end the pay is the same.

" Accepting a position " gives the subtle inference that the worker has been sought out and selected, which is far more flattering to the ego than to have it stated that the worker "has taken a job," which implies that there was no particular demand, but that the worker had to get out and go after the job.

The home paper always puts it with pleasing fitness—" has accepted a position "—and follows with a eulogy well meant but hard to live up to.

When a boy goes out on his home railroad in the stern reality of nailing a job he finds that no one is either enthused or excited over his arrival. He makes no splash. No one sizes him up as the home paper did, whereupon he writes back to the home folks that ability has no show on these older roads and that he is going West, where genius is appreciated and speedily rewarded.

That is one curious phenomenon of railroad work that I have always noted. No matter where you are, East, West, North, or South, in other far-away sections there are so many more chances for justice and appreciation and rapid advancement than where the worker happens to be at that particular time.

So our Home-Town boy, following the regular order, " resigns his position." Keep these finer distinctions in mind. Do not confuse the act of " resigning a position " with the coarser practise of " chucking the job." Well, he goes many leagues away, where the prospects are brighter.

A little later the home paper, indulgent and ever ready to boost, writes him up again: " Wilbur has accepted a fine position with the Cascade and Rocky Railway in Montarado."

It is now conceded at home that Wilbur will make his mark, now that he has thrown off the shackles of the moribund East or middle West.

From time to time, in rather rapid sequence, further word comes from Wilbur telling of his aeroplane ascent, first despatching trains, then with the superintendent's office, next with the general manager. The local paper predicts that soon he would be the head of the works.

Then there is a long time that no further word comes from Wilbur. He is married by now. At last his folks get a letter that he is seeking another location on account of his wife's health.

By and by Wilbur, his wife, and baby come home on a visit. Every one is glad to see him. Every one congratulates him on his rise.

A reasonable visit-term passes, and Wilbur stays on. The people of the Home Town begin to wonder why he does not go back.

People of small towns do not look passively on anything out of the ordinary. They have a curiosity that is corrosive. They assure one another that it is strange that Wilbur does not go back since he is such an important official.

By and by it comes out that if Wilbur can find anything on the home road he will not go back.

He has to make the change on account of his wife's health. Probably she is double-cheeked and triple-chinned and weighs one hundred and eighty-five pounds. That does not count. Climate is no respecter of avoirdupois. It assails the rich as well as the poor; why not the thick as well as the thin?

Wilbur now begins where he started, only with this difference: Instead of waiting and accepting a position, he now gets out and hustles for a job.

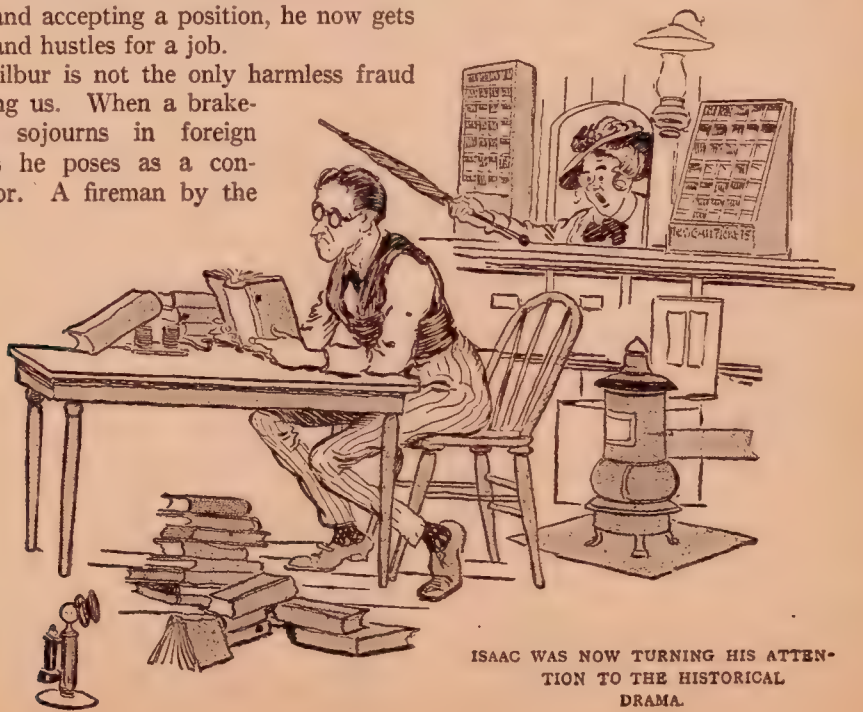
Wilbur is not the only harmless fraud among us. When a brakeman sojourns in foreign parts he poses as a conductor. A fireman by the same token becomes an engineer; an operator is a despatcher; a clerk is an agent.

Back in the Home Town all the boys are regarded as climbing upward and making for the top. It is all an innocent conceit of the same sort as "the bride is always lovely," the "groom is always popular," the "hostess is always charming," *et cetera, et cetera.* We are strong on panegyrics.

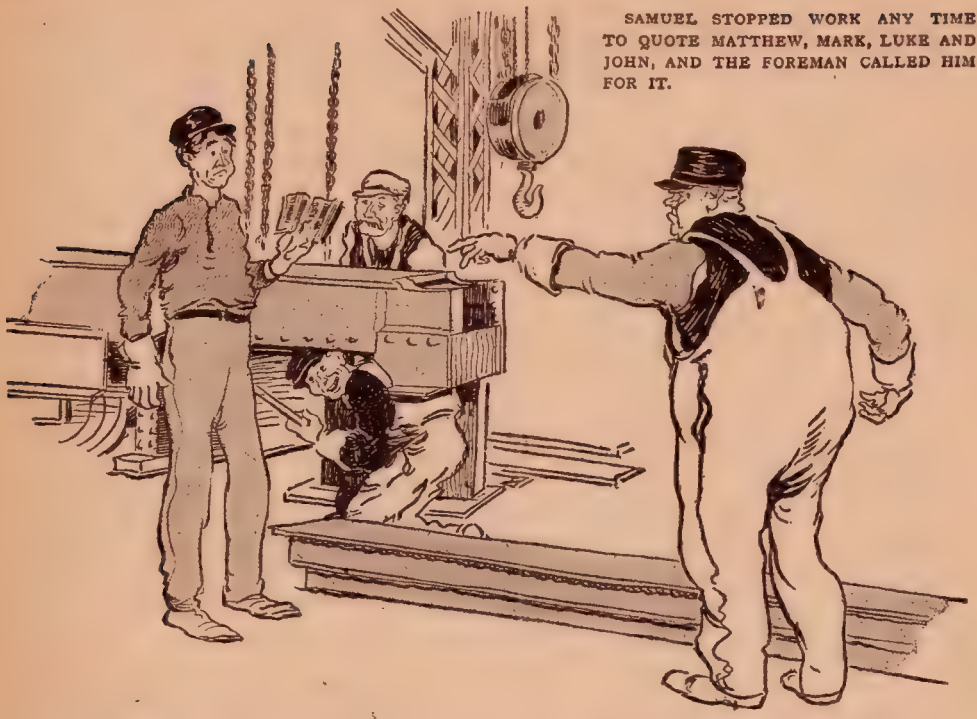
The old man who was proud of his son and boasted of his promotion to a day job of telegraphing after nine long years of night work was reckoning a little low on the average of Home-Town talent, but he was perhaps nearer to it than the general estimates of the Home-Town paper that has all the boys picking the best plums.

Let me illustrate all this by some real examples.

In the Home Town there was once a serious-minded citizen who harked back to Washington's farewell address and who quoted Lincoln and believed all his party



ISAAC WAS NOW TURNING HIS ATTENTION TO THE HISTORICAL DRAMA.



SAMUEL STOPPED WORK ANY TIME TO QUOTE MATTHEW, MARK, LUKE AND JOHN, AND THE FOREMAN CALLED HIM FOR IT.

said so faithfully and persistently that at last he was made postmaster.

He had a serious-minded son who went through the schools and scored E plus on Ancient History. When it came to Huns, Hunyocks, or Hibernians the boy was a marvel.

The schoolmaster confided to the boy's father that the boy would make his mark and should go on, but at the end of the school term there was a halt. It may have been lack of funds; at any rate, instead of heading for a university, the boy turned up in the local office as a student learning telegraphy.

He "plugged" for a year or two, and finally landed a job nights near a deep woods and a pond of frogs.

So far it seemed rather an inglorious start for a genius. Nevertheless, the home paper ventured the prediction that Isaac would be heard from.

As for Isaac and his father, they let it be known that such employment was only temporary, a mere makeshift, for the convenience of working out some great things. Isaac would now improve his time on certain intellectual achievements. Between the passing trains and the O.S.-ing Isaac would have unmolested hours for deep thinking.

It was whispered about that in this quiet retreat and retirement, and on railroad pay, Isaac was in reality engaged in the preparation of a philosophical essay.

In corroboration of this rumor of high-brow production Isaac sent back to the Home Town some new photographs, wherein he appeared wearing large amber-rimmed nose-glasses, through which he was gazing with a focus far-away and depth-penetrating.

Moreover, he had his hand to his cheek with his index-finger extended upward along the temple, which bit of affectation in all the politer circles betokens the scholar and the philosopher.

It was whispered about that Isaac was preparing a memorable paper. The father hinted of it often but rather vaguely. It was sure to cause a commotion among the intellectuals. That much was certain.

As nearly as the home folks were able to make out, it was to be an exhaustive

treatise on the Transmogrification of the Inverse, touching elaborately on the Henceness of the What, and going exhaustively into the Wherefore of the Whyness.

It was to make a name for Isaac, for the old schoolmaster, and the Home Town.

Somehow the months went by and there was not so much as a ripple on the intellectual calm of the country. The only marks Isaac actually produced were the stylus tracings on train-order manifold that set forth the plain ornamented command that "No. 75 would meet No. 76 Eng. 836 at Hawk's Siding."

The old schoolmaster did not lose interest. He asked the father how Isaac was coming along with the essay. The father replied that Isaac had laid it aside for the time.

He was now turning his attention to the Historical Drama. It would begin with Charlemagne reducing the Saxons, and was to come down to the modern twist of Von Hindenburg after the Latins, with an allegorical scene of the good ship Oscar.

Isaac had the worldly thought that the Historical Drama of the right sort would produce royalties enough for the author so that he need care not a whit for railroad jobs, and father could let them do as they pleased with the tariff and change postmasters as often as they liked.

A great philosophical essay would reach only a few, but the Historical Drama would reach the masses. In it, therefore, Isaac was the more certain of both fame and the wherewithal.

I do not know just where Isaac got off. All I know is that he never arrived. He started out with the wind in every sail, but never made port in any of the empyrean havens of the select.

He is now a day operator. The Home Town has forgotten.

Father is still postmaster. The last time the old schoolmaster inquired about Isaac, father said that Isaac was not doing much. His railroad duties — O.S.-ing trains—were very arduous and did not give him the chance to work out the great things he had in mind.

The old schoolmaster shook his head and said it was too bad that Isaac did not go straight from school to the universities where he would have been certain to make his mark.

"It is a shame," said he, "that commercialism blights the intellectual promise of our best young men."

Pat Donovan of our package local, who was often laid out because the despatcher could not get Isaac for orders, mildly observed that if the road had a few more "lobsters like Isaac" in its telegraph service, the local never would get over the road. "He's worse 'an a misfit!" almost yelled Pat Donovan. "He's a blank-blank-blank—"

(Not passed by the board of censors.)

The Home Town forgot Isaac and turned to Samuel in hopeful expectations of a distinguished career. Samuel took to railroading with an ulterior prospect beyond earning a salary. Samuel was of a pious sort, and in the heat of a local religious revival in the Home Town he conceived the ground plot of a great design.

Long before this Samuel had decided to become an evangelist. He had the ardor and youthful aspiration to lead the masses. The only thing that embarrasses and impedes an ambition of this sort is the masses. It is an inert and unresponsive quantity that will not be led.

Samuel had learned to stand up and talk fiercely and defy sin, but sin kept on at the old stand about the same as ever, and really did not know that it was being jeered and gibed at and stigmatized by Samuel.

The embryo evangelist at first thought the world could be revolutionized and remodeled with one grand whirl around the circuit. But an elder who was old enough in the campaign to be on decreased pay and headed for the superannuated list advised Samuel not to attempt too much.

He explained that this was a day of

specialists, and that if Samuel was wise in Christian zeal he would proceed down one avenue and with one class.

This arrangement would leave other portions of the populace to other evangelists; in the end there would then be a grand round-up and all the heathen wayfarers would be gathered into one corral and saved *en masse*.

The idea appealed to Samuel. After sweeping the field over with a critical eye he saw his opening. It came to him as a vision. It was the railroad and railroad men for him.

The old elder gave it his approval. Very wisely he told Samuel he could do nothing from the outside. He must get among the men and be one of them.

"If the yeast-cake is off by itself," explained the elder by way of pious illustration, "it will only get sourer and sourer, but if it gets into the dough and leavens there will be a fine loaf."

Samuel thereupon took it upon himself to become a railroad man, so that face to face and heart to heart he could lead them on to the higher spiritual levels.

"Some bellwether; eh, bo?"

Never mind that irrelevant and irreverent remark that some low-browed interpolator injected between these paragraphs. There is always a sneer for every holy design.

In the Home Town Samuel was praised and extolled in special service as if he were going as a far-away missionary to Chattahoochee or Chemulpo.

> Many are called, but few are chosen.—Matt., xx., 15.

I quoted that on my own hook just to show how handy I am in such matters. It conveys the "big idea."

Samuel decided to enter as a brakeman. Living as he did at a way-station, trainmen were all he could see as railroad employees.

He passed the examination and let out a little hint to the trainmaster that he hoped to be able to work improvement in the spiritual state of his fellow workers.

The trainmaster did not particularly enthuse. He let out some laconic expression like, "Go to it, old scout!" and assigned Samuel to Patrick Donovan of the package local for a few round trips.

I cannot record here all that happened, nor any particular event, interview, or circumstance that took place to change the purpose of the proselyte Samuel. All I know is that Pat Donovan is old and hardened in the service, and can make all the surroundings sizzle with sulfuric pyrotechnics when he becomes heated enough to let loose.

I am afraid that in the jump-spark discharge Samuel's high resolves got scorched, or that there was smoke enough to obscure the vision. At any rate, whatever it was, something flagged Samuel. Between all of us here assembled, I wouldn't put anything past Pat Donovan of the package local.

We might put it this way: That Samuel sought a transfer to the yards from the train-service, as thereby he could be next to a great many more railroad men who needed spiritual contact and uplift. This lifts the ban of suspicion from Pat Donovan as being in any way the cause of the transfer.

How many of us recall that old, old saw of something that "jumped from the frying-pan into the fire"?

Samuel was transferred from the association of Pat Donovan, conductor, but lit squarely at the right hand of "Bud" Laub, yardmaster, who goes by the beautiful sobriquet of "Old Red-Neck." Laub was of the ancient order of switchmen who yelled all their orders and cussed by note, having a vocabulary of only about fifty words outside of the swears.

It took him just two days to fire Samuel. He did not give any particular reason, saying only that Samuel wouldn't do. "You can't run a railroad on that glory-hallelujah stuff," he reported to the trainmaster.

Samuel made one more try. He found work in the shops, but stopped work any

time to quote Matthew, Mark, Luke, and John; and the foreman called him for it. On the fourth day when he laid aside all his tools to explain to a fellow worker what Peter meant in chapter v, verse 8, the foreman said he could go up to the office and get his time. If the railroad had meant for the shops to be a chapel or a Sunday-school, the foreman added, they would have had a spire or a belfry on the shack.

The Home Town expected great accomplishments from Samuel's efforts among railroad workers, and there was surprise when he came back so soon. Samuel quoted some scriptures that fitted his actions and let it go at that.

A little later he was appointed to an outlying circuit at Murphy's Crossroads, and so far as I know railroad men are still without a shepherd.

Then I remember how the folks of the Home Town shuddered for the fate of one "Micky" McGuire, who had no father and ran wild.

He was freckle-faced and neglected. The greater part of his time he hung around the railroad and flipped trains. He could tell every engine number by its whistle and the sound of its bell. He knew the names and runs of many of the conductors and engineers. He knew a lot of railroads by the initials he observed on the cars.

Of all that little community only the agent took a liking to Micky, who ran errands and made himself useful in small ways solely for the sake of association.

Somewhere under the tousled head and under the freckled skin there grew a single idea: That there was nothing else in the wide, wide world to think of, to talk of, or to dream of, but railroads.

The garrulous old Home Town took the usual notice of Micky. It observed that some day he would get one or both his legs cut off, and that, escaping this awful mishap, it was only a matter of time when he would run away from home and become a "bo." No one boosted for Micky.

Micky continued to hang around the station. The trainmen got to know him him and pulled for him. Then the agent fixed him out with a learner's outfit, and before the Home Town woke up or thought it possible, Micky was a telegraph operator and had a job and was taking care of his old mother, whom he was born to disgrace.

Time went on and Micky went up.

And now it is no longer Micky. The name is written M. J. McGuire. At the end there is the title T. M., which in time there is every reason to believe may be changed to Supt.

How the Home Town did miss it on Wilbur and Isaac and Samuel! And how they did miss it on Micky, of whom the only utterance was the prophecy of a bad end.

The boost of the Home Town does not make a railroad man. The real success comes from a genuine interest in the business itself, as Micky—I beg pardon—as as M. J. had.

You cannot make it impersonal and ulterior and win out in it—not in a thousand tries. That's about the truth applied to whatever we may seek to do.

With this final word let us be adjourned.

THE COUPON-CLIPPER SAYS:

The tramp on the brake-rods doesn't care who's receiver of the road.

From the Railroad Man's Magazine.

HOW TO FACE YOUR 50TH YEAR.

Mr. Railroad Man, Don't Let Yourself Get into a Rut—Keep Smiling and You'll Stay Young.

BY LOUISE D. MITCHELL.

T forty, at the very latest—which in many cases is too late—every railroad man should prepare himself to go through the test of his fiftieth year, and watch for and guard against the first signs of its approach, which is the tendency to repetition both as to habit and to speech.

The railroad man is face to face with a monotony in his business life which is more marked than in the life of many others. Everything is supposed to run for him on schedule time. And this machine-like process of his bodily activity has a tendency to produce a "machine-made" mind. The fatality in this is stagnation for him.

At Fifty a Man Doesn't Smile Enough.

By some curious process of nature, as we approach our forty-fifth year most of the pleasant things we have had in our make-up show an inclination to retire permanently from active service. It is the great necessity to retain these in our systems past the fifty-year mark that should make every man put up a stiff fight for that object.

No matter what any one tells you, do not believe that good is stronger than evil, for it is not. Evil grows from its own root—with its "tap-root" far back there in primitive man—but good is a graft-plant and lives only under transplanting or grafting onto something that has made a place for it.

Therefore, everything that is actually pleasant in you to-day has either been acquired, or grafted onto your character, by environment, conditions that have been what you wanted most, or a deliberate effort on your part in the way of training, in which philosophy or religion or experience has taught you that it pays better, are the moving factors.

Don't Grow into Aged Pessimism.

You know, by either experience in your own life or observation in that of another, that in order to get where you want or what you want, graciousness and cordiality are the two best factors for success in that particular line. Like the man who found that honesty "*was* the best policy," you've tried both ways, and learned that a grouch wouldn't get you where a big laugh would. So, hold fast to the laugh.

Repetition is the death of interest. Keep that fact in mind. And beware of "cylinders." They point to deterioration for you. We all know that the "government is awful" (Cylinder No. 1), and that all "corporations are made up of nothing but crooks and robbers" (Cylinder No. 2), and that "every man you meet is a liar and is only waiting to do you out of everything you own" (Cylinder No. 3), so keep that information to yourself. The use of it is going to paint you in the drab colors of—a bore!

The world is rushing by you to-day at a steady, brilliant pace. Its habit is to pick up only that which is new and fresh and

will help to accelerate that pace, and when by chance a bore sticks to its well-oiled wheels it tosses him out there on the world's big scrap-heap and eventually makes no use whatever of him except to fill in new ground.

Beware, also, of total recall. All the yesterdays are out there on that above-mentioned scrap-heap. The world lives only for to-day and that shadowy to-morrow. It doesn't even remember that there ever was a yesterday.

Yesterday Is Past.

Don't make the mistake of trying to remind it of them. It neither wants nor needs to be told. You can count on the fact that whatever good was in it has been squeezed dry before it was passed over in the rush toward the Land of Successful Endeavor.

Your daily motto should be "KEEP FRESH."

And this means in body as well as in mind, but particularly in mind. You can make your body anything you want it to be, but your mind can make you anything on earth it desires, once it has taken things into its control and gotten the upper hand.

If, therefore, it is so powerful an agent for your making or unmaking, it is something to be reckoned with from the start. Regard it, then, as you would a subtle poison that was going to undermine your system and cut off your working capacity, or an actual living enemy that was ever waiting the chance to get you when you were off guard.

Don't lose your grip on the power of clear, cold judgment. Take the middle track of reason and watch the facts on either side of you before you express an opinion. It's the summing up that gives value to a verdict.

A man doesn't need to deteriorate at fifty—he doesn't need to lose his job then, but he unconsciously, occasionally stubbornly, prepares himself for that disaster.

Keep this fact in mind. A man is a failure only when he hasn't succeeded with the material he has had in hand to work upon. Henry George is right—"a man's ability is his working capital." He should expect returns only on the amount and value of that ability which he has invested in work.

Have you overestimated yours?

One of the worst enemies the man of fifty encounters is the growing conviction that it is too much trouble "at his age" to strive for the thing that was so much worth while twenty years ago. The active agent of Too Much Trouble is Mr. Comfortable Rut, and he has oiled the way down into that bed of stagnation so well and so imperceptibly that the descending victim rarely feels the jolt of his deterioration.

Beware of Mr. Comfortable Rut!

Therefore, beware of Mr. Comfortable Rut also. If you don't feel a jolt now and then in your business life, sit up and take notice—you are sliding backward!

One of the best things that could come to you at fifty, no matter how hard you have worked up to date, is that you still have to put your intelligence and effort into the maelstrom of human energies in order to facilitate your living.

It's the big, hard polish that will keep your brain from rusting. The man who at fifty or sixty lets go of his business energies altogether begins his period of deterioration. The body and brain accustomed to a set of habits that have been in use for forty or fifty years, unbroken, do not take kindly to a sudden cessation of such training. Therefore it is that retirement from business at that age often means a retirement into old age.

Every man to-day, whatever his situation, should plan to carry a side-line in interests to combat that chance of deterioration at the expiration of his business career. It should be something, however humble, that could be made to extend beyond that period of retirement.

This is a point for the pensioned man to regard with the unusual seriousness which the matter deserves.

What is your side-line of safety to-day, brother?

Welcome, don't shun or rail against, the new ideas in business methods. Every time your office or your corporation goes through a great upheaval, sit tight, watch for the progressive "germ" in it, and deliberately—no matter how much you may disapprove of or resent the changes it has made—adjust yourself to it. Learn to fit into the changes cheerfully, too. A morose attitude toward the inevitable is simple folly.

You are only a part—a very small part at that—of the great railroad corporation with which you are associated. Rusty and worn nails or bolts are never useful for constructive purposes. Print that hard fact and hang it up on the walls of your memory. You'll need it when that great upheaval takes place, if you haven't made good.

Keep Abreast of All New Developments.

Out there on the world's scrap-heap are hundreds of discarded nails and bolts that wouldn't even take the trouble necessary to keep themselves polished enough to disguise their fiftieth year—which, liberally translated, means their uselessness!

Associate with the progressive man whenever opportunity offers. You may not like him personally—you may even distrust him and have good cause for doing so!—but it is not the *man* you are after; it is *the new idea.*

And only progressive men have it. They are the unconscious guardians of the onward movement of the whole world's unfoldment—or evolution. Therefore, never let them get far out of your sight.

Watch every man you know of who has gotten ahead. Study, microscopically, the step upon which he has elevated himself and see whether it does not suggest to *you* how to advance on the step above that.

If you think there is a relative of the boss's who stands in with the boss for a chance of advancement ahead of you, don't waste time trying to "work in" with the boss, but admit the luck of the other fellow and go for his friendship. The progressive man deals in "futures" only.

Avoid "Old Men."

Avoid the society of "old men." Old men are the cylinder-grinders—the dry-as-dust experience and grouch repeaters—who will try to prove to you that they have the world by the tail and are twisting it their way!

Remember, there is a big difference—a progressive difference—between an old man of fifty and the man of maturity of the same age.

And then there is the young blood besides. Keep in between the two latter with your eye inclined toward the younger and fresher mind.

There are not many corporations of whatsoever character to-day who can afford to stand for the mistakes of young blood. But the majority have learned by experience that often, very, very often, in the mistakes of young blood lies dormant the germ of the big idea; so they take a chance on that fifty-thousand or hundred-thousand-dollar possibility.

But you "old men," you with your moldy ideas that have been good enough for the past fifty years or more, you are not a profitable investment for them. And to keep you on without any ideas at all would soon make their pension list too large.

Never lose sight for one moment of the rock-bound fact that profit in business is always looking for its soul-mate—dividend.

You've Got to Be a Producer.

If you can't put it farther along on the trail for that object, just why should you be expected to be retained in their service? It's not even fair to your employer to expect it. He is there to advance profits and to avoid losses, and he'd be a poor business man—and probably not qualified to keep his own job—if he overlooked you.

The Big Idea requires two nurses at

birth—Money and Experience. And neither young blood nor old blood need apply. With this process of elimination narrowing the applicants down to the needed few, who better fitted for acceptance than—you? Here, then, is the chance for the man of fifty who has kept his mind fresh and stepped out briskly with the pacers.

From fifty to sixty a man has only his experience to invest, with his natural energies as a small asset only.

What are *you* doing with yours?

Paying it out in a long string of "total recall" to those who either by relationship or some other forced situation are obliged to listen to you, or are you getting in something on the output? Many a man of fifty of to-day is a millionaire in experience while perhaps but a small-salaried man in the way of income.

Make Your Experience Pay Dividends.

The man with assimilated experience—with years of accumulated facts carefully digested so that the valuable has been separated from the unavailable—has a gold-mine in his possession, and should find himself somewhere far in advance of where he started if he has made his investment of that experience with intelligence and caution.

But the danger for the man of such experience is that he refuses to admit a new view-point on his own set of ideas. The advice of the father to his son is worth quoting here:

"Listen to *all* the suggestions and advice that may be offered to you, my son, but have a care how you act upon it."

Advice never hurt any one yet, and if deposited in the Bank of Future Needs, makes a good drawing-account for the man who has been fortunate enough to have received it.

Whatever your object in life, keep that foremost in your mind and make everything you receive or give or do converge toward it. Do not forget that a "kick" may send you farther along toward that object of yours than a pat on the shoulder would have done, and that a "push" or a "pull" is more likely to trip you up than a shove.

If your goal in life is what you are really working for, what does it matter if you've received some hard knocks all along, provided you have really attained that goal in the end?

Hold Fast to Your Humor.

Keep your view-point sane and fresh in everything—even in the things that have cut you the most. Life isn't hammering you for the sport of the thing, but to edge you over nearer to the very thing you have wanted most and worked hardest for.

And above all things hold fast to your sense of humor. More times than the contrary you've cursed where you should have laughed, and you've lost out by it. That "sore feeling" is the forerunner of the "grouch" and will land you eventually among the old men of your day.

And finally let this fact be taken into your consciousness for future reference: No man passes the acid test of his fiftieth year in safety who takes into that test a disgruntled or stale-fed mind, for there is no discontent with progression in it that doesn't have as its first cause the betterment of mankind.

THE COUNTRY STATION AGENT SAYS:

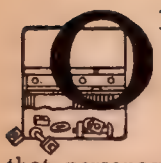
NOBODY could be so accurate as an auditor looks.

FROM THE RAILROAD MAN'S MAGAZINE.

"YOU DO SOLEMNLY SWEAR—"

In Oregon Consignees Must Make Affidavit Before the Railroad Can Give Them Their Shipment of Booze.

BY J. C. WRIGHT.



ON the first day of January of the present year Landlady Oregon removed the personal effects of one D. Rum to the hall and bade that personage begone. Since that date the manufacture or sale of intoxicants has been forbidden, and importation is limited to two quarts of spirituous or vinous, or twenty-four quarts of malted liquor for each adult in the twenty-eight-day period.

Where They Get Their "Bundles."

It follows, therefore, that the thirsty ones must ship in their "bundles"; and this, of course, means that same must be distributed from the office of a common carrier by the representatives thereof. Wherefore there is gone from our midst the smooth young man who used deftly to scrape the "collar" from the tall ones, and in his place we have—whom? Our friend, the station-agent, bless me if it isn't!

The delivery of these bundles, hedged about as it is with yards of legal red tape, is rapidly becoming a leading feature in the all-purpose agent's routine—and a mighty ticklish one. An idea of the responsibility involved can best be obtained by a summary of prescribed formula of delivery.

The bundle, plainly marked as to consignee and quantity, is received and consignee notified. A special delivery book must be signed, in addition to the regular book. If consignee is not known, he must be identified.

The agent then searches his records to make sure that consignee has not exceeded the legal allowance for the four-week period. The modern dispenser then gives consignee an affidavit to sign which sets forth that the signer is of legal age, not a habitual drunkard, and within the limit; and this being done, he causes consignee to hoist his right hand aloft while repeating rapidly the following incantation:

> "You do solemnly swear that the statements made in the affidavit signed in my presence are true so help you God? Awri'. Gimme a nickel!"

For the laborer is worthy of his hire, folks. Never doubt it. A notary fee of five cents is assessed for repeating the above monologue, three and one-half cents of which is velvet and passes into the sole possession of the notary, to have and to hold or spend in riotous living, as he chooses.

Jitney Notary Earns His Fee.

Now, three and one-half cents is no great sum in itself; but if the thirsty ones muster in sufficient force, the aggregate may become quite a respectable piece of change in time. Quite frequently the "bar" commission compares favorably with the other minor sources of revenue about the station.

But the agent will tell you that the commission is well earned. He will point out to you that there is a little matter of "fine or imprisonment or both" staring him in the face if he allows an "overdraft," or permits a "habit." or a minor

to receive so much as a "snort" over the "bar."

And, careful as he may be and is, a "repeater" will contrive to repeat ever and anon; the habitual guzzler will find a way to assuage his thirst; and the minor will manage to palm himself off as of legal age. Then the fireworks begin for friend agent.

At the end of each month the agent forwards his affidavits to the county clerk, and awaits the result with fear and trembling. That argus-eyed official checks them over carefully, and wo betide the agent if they are not in order. A letter, subpena, or visit from the sheriff will be the next step.

Agent Always Loses Out.

In case a violation of the law has occurred, the agent is the first witness subpenaed. He must up-stakes and away to the county seat, there to remain until the defendant has been convicted or acquitted.

And no matter which way the verdict goes, the agent loses. The accused, his parents, brothers, sisters, friends, heirs, and assigns will in all probability cherish a more or less active resentment toward said agent so long as memory remains with them.

Right here I want to extend a brotherly tip to those sterling "cerealists," Smith, Harte, *et al.* If so be there are not enough happenings of sufficiently dramatic nature to set the *H.* and *H.* fraternity to grinding out copy, or the doings on Section 27 become intolerably humdrum, then bring your *Honks, Horaces,* and *Caseys* to Oregon and set them to tending the "booze counter." Things will happen to them then. The muse will attend.

By way of illustrating what the agent is up against every hour of the day, it may be well to detail a few actual instances where agents have got into hot water.

Smith had exhausted his allowance and was athirst, so he induced a "floater," whom we will call Jones, to order an additional supply, Smith furnishing the sinews of war. Jones being somewhat undependable, Smith requested the agent, with whom he was acquainted, to notify him when Jones's bundle had arrived. The agent immediately became suspicious, but duly notified Smith.

In the mean time Jones had obeyed the call of the road, and Smith was in a quandary. He finally induced a second floater to impersonate Jones, and went with him to get the shipment, vouching for his identity to the agent. Although scenting a decidedly ratty odor about the transaction, the agent proceeded with the delivery.

The hitch came when the pseudo Jones was commanded to sign the affidavit. Jones's initials were E. O. The floater, after a marked hesitation, began to form a P.

"What is your name?" suddenly thundered the agent.

"Patrick O'Brien!" the startled man replied.

The agent read Messrs. Smith and O'Brien a short lecture on the doubtful delights of perjury, and allowed them to depart.

Caught Ringing In Dummies.

In another instance the agent allowed his loyalty to the company to tinge his judgment, and is now forming new resolutions in a certain State institution.

The foreman of a factory located in a small town was about to turn one of life's milestones, and was desirous of celebrating the event in the good old-fashioned way. He caused to be shipped to five of his Italian laborers ten quarts of spirits, and went to the station with them one evening after work.

It presently developed that the five laborers could neither read nor write, and were, of course, disqualified. The agent at first refused to deliver the liquor, but the foreman's threat to withdraw the factory's business in favor of a competing line frightened him into submission.

He stipulated, however, that the fore-

man must sign the laborer's affidavits for them, which was agreed to. The agent then went through the form of swearing each man, but as they did not understand a word of the oath, this was mere pretense.

It happened that the local authorities had received a hint of the proposed transaction, and had viewed the whole scene through a rear window. They shadowed the departing customers, and were later able to testify that the entire consignment had been transferred to the foreman. The entire group was arrested, and the foreman and agent were convicted and sentenced to short terms.

Dodged the Age Question.

A rather elaborate plot on the part of a young man not of legal age got another agent into a peck of trouble.

The youthful tippler, who was well known to the agent, appeared at the window one evening with his right hand swathed in bandages, due, he explained, to an injury received in operating his father's automobile. He engaged the agent in a political discussion, which ended with the young man's declaring:

"Well, I shall do my part toward electing Blank."

The agent naturally inferred that the young man was a voter, and did not question him as to his age when he later asked for a shipment of liquor. The deceitful youngster apparently made an earnest attempt to sign the affidavit which would have cleared the agent; but was apparently unable to guide the pen with his injured hand. After several futile attempts the agent good-naturedly signed the document for him, and the boy went away.

The "injured" hand did not prevent the youngster from taking out a party that night, and, the bundle being broached and freely circulated, the inevitable accident occurred. Two of the riders went to the hospital more or less broken to pieces.

Immediately the public began to clamor for the conviction of the man who had supplied the minors with liquor, and the agent was arrested. At the trial, the defense admitted that the young man had not signed the affidavit; but the clever youngster broke down under cross-examination and confessed the truth. The judge then dismissed the agent with a warning which it is safe to say has been scrupulously followed.

Bribes Are Sometimes Offered.

Not infrequently the agent is offered a bribe or gift if he will allow a repeater to work at his trade; but that sort of thing seldom succeeds. Railroad and express agents are notoriously honest.

There is a lighter side to the new business. An agent friend of mine who is given to jokes of the practical variety derives a great deal of amusement in administering the oath to his friends, invariably requiring them to "kiss the book," and reading into the oath considerable extraneous matter of a personal nature.

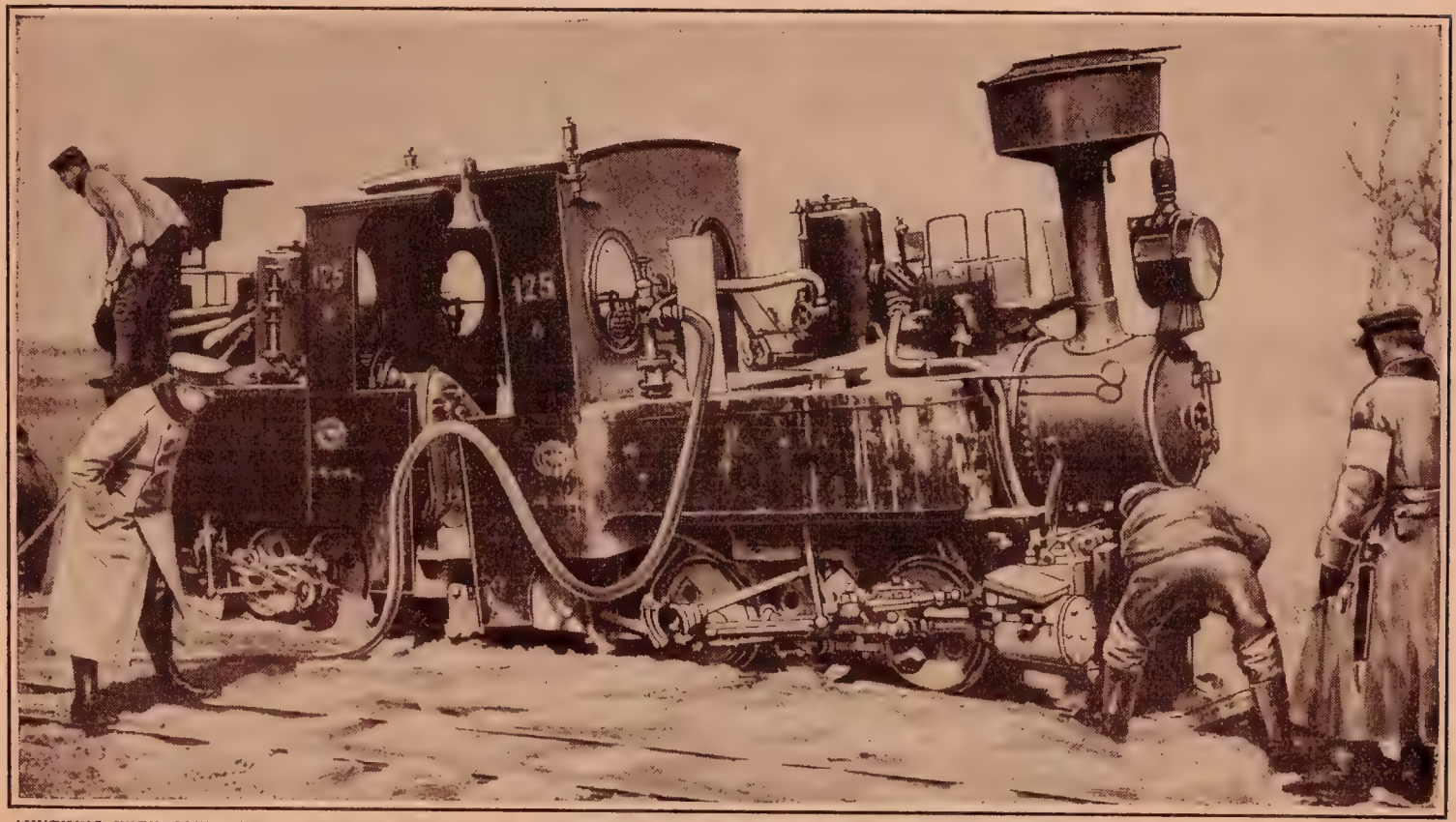
The "book" used is his railroad book of rules, which, he afterward explains to the victim, is a railroad man's Bible, and therefore available for the purpose. On the whole, though, the notary takes his work mighty seriously—and with reason!

THE MAN WHO WROTE RULE "G" SAYS:

The Christmas spirit can be poured out without resting a foot on a brass rail

FROM THE RAILROAD MAN'S MAGAZINE.

AND AT THAT THEY CALL IT A LOCOMOTIVE!



ANYTHING WITH COUPLED-UP WHEELS AND A BOILER IS A LOCOMOTIVE IN THE WAR-ZONE THESE DAYS, AND IF YOU DON'T BELIEVE IT TAKE A LOOK AT THIS RIPE OLD RELIC. THE GERMAN PHOTOGRAPHER NAIVELY INFORMS US THAT THIS WEIRD TRACTOR HAS BROKEN DOWN AND ADDS, "TEUTONIC THOROUGHNESS AND PERSEVERANCE IS NECESSARY TO VENTURE THE DIFFICULT JOB OF REPAIRING THE ENGINE AND CONTINUE THE JOURNEY."

THE SILENCE OF SMOKY SLAT.

BY CHARLES W. TYLER.

He Stood for an Awful Lot of Conversation from the Division's Wind-Bag; But Enough's Enough!

"'WINDY' GILHOOLEY," said some railroad wag—substituting the flatulent superlative for the more honorary title of Peter—and spoke the truth.

You have probably met the breed—"blowhards" are what a lot of folks call them, and anyway, unless you are stone deaf, you'll be side-tracked by the species sooner or later. A big head and a long tongue are their chief assets.

And so it was with Windy.

He was large of stature and pink of skin—and all mouth. He needed nothing to talk about to make conversation, and you need exercise no effort at repartee—just listen.

For there was no notable he didn't know—by sight at least—no famous resort he had not visited; no Inter-Mountain hog he couldn't keep hot; no girl he couldn't get if he wanted her. Always, the first impression he gave was of how much he hated himself.

You couldn't squelch him; you couldn't snub him. The boys on the Inter-Mountain tried it—and had to give it up. There was nothing the matter with him, and *he* knew it.

"The big fat-head!" snapped "Mainline" Crowley, coming in from an overland rawhide. "He couldn't heat water for an armless beggar to wash his hands with. The minute he found out he couldn't keep the old mill hot he climbed on to the pad and hollered 'sick'; then the shack took her and laid the pointer up against the pin, rosy—and right off Mr. Gilhooley is all well and wants to take 'er.

"He did; and he had another holler in ten minutes. What that big stiff don't know about keeping a hog hot would make a chapter in the Lost Arts."

Just then Windy himself appeared in the door, coming from the washroom. If he had heard any of Mr. Crowley's remarks, he gave no evidence of it; for he crossed the engineer's room, slapped the hogger familiarly on the back and opened up with his customary line of chatter.

"How's the boy?" he began, breaking in on a conversation that had suddenly developed between the Mainline gentleman and one pig-eye Parsons. "Some heavy trip coming up, old head, what?"

"Uh-huh!" grunted the runner. "Trip was all right when *you* weren't firing!"

"Aw, have a heart, man. I'd have made that old iron horse walk through the dew if I'd been feeling good—"

"Yea-ah, sure!" crabbed "Smut" Burns, who owned the Burlington pick-up job. "Something you ate went to your stomach, didn't it?"

"Honest, now," bluffed Mr. Gilhooley, "if I'd been feeling all right I'd 'a' blowed her dome off; but the butter on those darn sandwiches I got at Wendal raised a mess in my bowels for fair. Knocked me plumb out."

"Too bad it didn't kill you!" grumbled Mr. Crowley sadly.

Windy ignored this shot, and turned

his remarks into a channel concerning his latest conquest, which same centered around the sprightly young lady who tended the news-stand at the station—Katy Leary.

"Some filly!" said Mr. Gilhooley eloquently. "Some cooze, that chicken—and I'm right there strong, guy."

"You are, are you?" demanded Mr. Parsons. "Huh! You're a divil with the women, ain'tcha? Well, so be it; but take a little tip from your Uncle Dudley, son—don't let 'Slat' Ward get wise that you're shining up to this Katy daisy, or he'll be looking for a soft spot on your handsome phiz to bury a cluster of fives."

"Hump!" sniffed Mr. Gilhooley grandly. "I should worry about Slat! *I* had the gloves on with John L., and stayed five rounds at the old Howard once!"

"You did, eh?" grunted Mr. Burns of Burlington. "Well, you great big heifer, you're husky enough to stand up to Willard, and you've got jaw enough to be your own press agent, and you may be a son-of-a-gun with the wimmen, but that's all—you're dead from the roof of your mouth up."

No; Windy was not popular on the Inter-Mountain, and yet he viewed all the rough cross-fire which came his way in the light that it was only josh, propagated on the grounds of familiarity. He was a "good fellow," and stood strong with the gang—that was why they allowed themselves these liberties of expression.

Peter Gilhooley was a mixer with men; he was a favorite with the women; and he stood pretty well with himself. Slat Ward was of a type directly the contrary. This gangling, loose-jointed person was about as homely as they make 'em; but the redeeming feature of this fact was that *he* knew it, and was not ashamed.

He was of medium height, weighed one hundred and fifty pounds, had straw-colored hair and a sandy complexion. The latter was generously sprinkled with freckles of goodly proportions, the same being distributed with unholy abandon.

Also, his swanlike neck contained an enormous Adam's apple which jutted out above his collar in a most unlovely manner.

Again, Slat never talked unless cornered; and even then very little — no more than was absolutely necessary.

The principal thing he considered his tongue good for was to weld a lap seam on deftly constructed paper pipes of his own manufacture. He was an artist at this, and next in line and quite on par with the latter feat was his ability to keep the scrawniest, hardest-steaming old hog on the division up against the gun under conditions most adverse.

But as far as women were concerned he was all at sea. He was so bashful that he would blush if a girl looked at him, and pretty nearly drop dead if one happened to smile his way. He regarded the species with awe and the utmost respect.

This, perhaps, was because of the devotion with which he tended his mother, whom he supported. Nearly every one had a good word for him, though the boys on the Inter-Mountain didn't profess to understand how a man could go on living as dumb as Slat Ward.

How it ever happened that he ever became so friendly with as vivacious a person as Katy Leary was another mystery. Though it was a fact, and "facts," says Cocker, "are the only things which can not be explained."

And, again, an old axiom tells us that "opposites attract." This may have been it, too. But whatever it was, Katy Leary appeared to be the only one who could draw Mr. Ward out of his silent shell of reticence.

So it was at the time of the opening of this story our young friend Slat had enshrined Miss Leary on a pedestal with a gold halo about her fluffy head. She was neither a chicken nor a squab nor a coozy to him — just Miss Leary in burnished letters.

And it so happened that he had never happened to hear any one else refer to the young lady in particular, other than as Katy. He had missed out on the occasions when Mr. Gilhooley was proclaiming concerning her in the vernacular of the day.

Windy knew Slat by sight, and Slat knew Windy by sound — he had never paid enough attention to the big fellow to form even a bowing acquaintance. But on the other hand Windy would have liked to know Slat better because the latter appeared to be such a good listener.

Yet neither found occasion for conversation with the other till one night a few days after the conversation recorded between Mr. Crowley and Mr. Burns and Mr. Gilhooley.

Windy was first out on the board; Slat second. The crew-despatcher called both at the same time. They were to make up two crews, which were to deadhead to Albans, twelve miles east. One gang was to take a train to Burlington, and "hit the plush" home; the other to go out on a rounder—Hilton and return.

The first was the better paying job because it offered opportunity for a day and a day for deadheading; while the second was good at the best for a day and overtime — possibly — and only twenty miles for deadheading.

Slat had been distinctly called for the former; Windy for the latter. Perhaps the crew despatcher wanted to give Mr. Ward the best of it, anyway—crew despatchers play favorites sometimes just like everybody else—or it may have been plain oversight.

But whichever way it was, Slat climbed aboard the hog assigned to the first-named job, and proceeded to get the engine ready as usual. Windy, as was his habit, lingered along the way till he was last—like the proverbial cow's tail.

It was, also, about this time that he discovered that while he had been "first out" he was getting the "second out's" job. Quite true to human nature, he would never have said a word if, by this twist of events, it was provided that he get the best of it. Under existing conditions though, it behooved Mr. Gilhooley to let out one loud howl, which he was quite capable of.

"You got my job, feller!" he proclaimed, grunting up through the gangway to where Slat was getting the gagelights in position. "First out gets the Burlington string—that's me, rube."

The lanky youth addressed completed his task in silence; then turned to eye the other.

"I was called for the job," he said at length; "that's all I know."

"That may be!" blustered Mr. Gilhooley. "I'm not saying what you got called for; but I say *now* that you've got my job, guy. Savvy?"

And Windy thrust his head forward, chin out, threateningly.

Slat ignored the hostile attitude of the big fireman, and began gathering up his coat and jug.

Engineer Bill Flanders pulled a sweaty face down from behind the lubricator, while he glared at the intruder ominously.

"Don't let the big sneeze bluff you, Slat!" he admonished severely. "He isn't hatching any eggs for the company —not on hot air, by a darnsite."

"Aw, 'tisn't worth arguing about, anyhow," said Slat indifferently. "What's a lot of rowing get you?"

And he of the soft answer slipped into the blackness and trudged in the direction of the big 1248, that was marked up for the rounder's train.

"H-m! They aren't putting anything over on Peter Gilhooley, cap!" exulted the aggressive victor. "What?"

Mr. Flanders, however, was too disgusted because of the Slat individual's meek and undemonstrative withdrawal to voice any comment on either side; so he said nothing, but merely communed within himself profanely.

It had been the heartfelt wish on the Inter-Mountain for a long time that

somebody would one day call the Windy gentleman's mouthy interlopings with a swift swat where it would produce the quickest quietus. As yet though, the much hoped-for poke in the chin was but a vain delusion.

Mr. Gilhooley was a pretty beefy boy, and while he might be mostly bluff it isn't always using good judgment to start a fight till you have a little inside stuff regarding the kick the other fellow packs in his mitt—be he big and windy, or small and silent.

It was only quite natural that the Inter-Mountain boys should be a bit conservative concerning personal aggression in the matter, though they could be depended upon to exhibit considerable enthusiasm when some one else threatened to break off diplomatic relations. It was understood that Mr. Gilhooley took so much stiff gab because he was too thick-skinned to be offended, but could you call his bluff and *start* something without getting knocked plumb cold? *That* was the question.

Slat Ward and old "Side-Rod" Rowell and the 1248 didn't have a very auspicious trip to Hilton and return. In fact the job got tied up for rest at the latter terminal, took twelve hours, and were fourteen coming home.

This was most untimely, as far as Slat was concerned, for he arrived at headquarters just ten hours late for a little appointment which he had scheduled with Miss Katharine Leary.

Katy kept her end of the affair, however—kept it with one Peter Gilhooley, who appeared most opportunely, and escorted her gallantly to the scene of festivities at Whalom by the lake.

The Burlington job had made a quick-time run, with good connections for the return on the "mohair" of No. 36. Thus it was that Windy was enabled to be Johnny-on-the-spot anent the captivating of the lady in question.

You really couldn't blame Miss Leary; for she was engaged to no one, and an excursion was fun, and a man was a man.

Both Miss Leary and Mr. Gilhooley spent a very enjoyable evening, and returned home quite satisfied, and all might have been well but for one thing—Windy talked. And being more or less human in his way, he padded the subsequent conversation a bit to conform with his own ideas of what a sociable evening *should* be like—and at once foozled the hash.

It was in the engineers' room two nights later. There were gathered several genial gentlemen of smoky-end fame, also Mr. Gilhooley and Mr. Ward.

As usual, the former was up-stage with an earful of jaw-music. Slat, however, was over in a corner perusing the complicated chart of a Baldwin hog—silent and attending strictly to the educational end of the game.

"'S no use," proclaimed Windy with bravado, "you've got to hand it to me for working the ropes. I guess I'm there, boy—yea-a, *bo!* Har-n-h?"

"So you seem to think," said Engineer Rollins dryly.

"What's hurting you now, that you want t' tell us?" grinned a certain ex-cow-man—Buzzle by name, who railroaded and owned a sheep pasture "somewhere in Wyoming" to boot.

Windy shot a glance across the room in the direction of the blond-headed person who was hunched studiously before the chart of the Baldwin hog; then twisted the left side of his face into an expansive wink, which included the assembled rails. He'd make Slat the goat, kid him along about losing out on the Burlington job the other night—incidentally, too, shoot over a couple digs concerning Katy of the news counter.

This hungry-looking smoke who never talked would make a fine target for a few choice remarks, which were festering in his system.

"Huh!" he began. "Guess I kind of got a little something over on Mr. Ward the other night—going and coming—"

There was a pause. Windy eyed the back of Slat's head speculatively. Also,

the rest of the enginemen turned their eyes in the same direction—and waited.

"The boy pretty near jumped me," continued Mr. Gilhooley. "Was going to walk off with my job right under Peter's nose. Didn't get over though—did it, feller?"

The remark was obviously directed straight at Slat, but it brought no sign of acknowledgment. Windy was encouraged; he caught a couple of suggestive glances passing between others in the group, and decided to make up for some of the shots that had been flung *his* way.

It was an opportunity for which he had often wished — to make somebody look cheap in the eyes of the gang. It looked like a safe play, too. He went on tauntingly:

"'Outside, guy!' I says, and just like that. I've got his number. He may be a clam, but there's nothing the matter with his hearing—"

"I don't know about that!" interrupted "Northampton" Bill disgustedly. "It seems like there must be something wrong with him!"

"There is!" pursued Mr. Gilhooley, following up his lead. "He's in love."

"Hump!" snorted "Spike" Ide, tallow-pot, disappointed in his friend Slat, but still losing none of his dislike for the other. "It appears like it affects some folks one way and some different. Wardy goes plumb dumb and deaf, while it don't appear to affect you thataway at all, old Guz'looley."

"*Me?*" demanded the talkative one in tones of emphatic denial. "*I'm* not in love! Whatcha think I am?"

"Well, I saw you coming home with Miss Leary night before last, and it looked some suspicious," said Spike accusingly. "That, and all you've been beefing about what a hit you made with the young lady."

At this Mr. Gilhooley laughed boisterously.

"Take it from me," he said as his mirth subsided, "*this* boy ain't falling for any of 'em. Cu-*pid* proof — that's me! Man alive! I can get any chicken going, but that ain't saying you see *me* losing my nut over the best little filly out of grammar. This Leary dame, she's over six, but there's a lot she don't know—"

Here he paused significantly; then added:

"But leave that to me—"

There was a movement over in the corner. It was Mr. Slat Ward getting up from his chair. His progress was neither hurried or apparently actuated by great excitement, but provokingly deliberate.

Mr. Gilhooley hesitated, while all eyes centered on the freckled individual who had seemingly been intent only on memorizing all the technical phrasing that had to do with the superstructure of a railroad hog.

Slowly Slat straightened himself; then edged his way across the room to a spot directly in front of Windy Gilhooley. Every one held his breath, while the big fireman moved back a step involuntarily.

He wasn't exactly afraid of the lean gentleman before him, but at the same time he didn't like the look he saw in the other's eyes; still it would never do to show the white feather now. He must bluster it out.

There was more fear in his heart than his voice when he said:

"Well, what's gnawing you, feller? Want to be sure you know me next time you jump a first out's job? Huh?"

It was the deadly calm in Slat's voice that should have given the other warning, for his tones were ominous with a rigid intensity, while he wasted no words in lengthy phrases.

"Gilhooley!" he said. "*You* got a poke in the jaw coming to you."

The gentleman addressed made his second mistake when he accepted this statement as something that was threatened for the indefinite future. He breathed a sigh of relief, and laughed outright. He could still bluff through.

"Huh! You funny-looking geezer! Why, if you ever hit any one you'd drop dead with surprise."

A mouthy preamble to open hostilities often paves the way for savage threats that only peter to honor satisfied. Mr. Gilhooley took advantage of this fact now. He planned the maneuver, however, while underestimating his adversary.

Slat ignored the insulting references to himself, and continued:

"I've got nothing at all to say about surrendering up that Burlington job the other night—that's gone. And again I don't exactly hold anything against you for your insinuations concerning my personal charms, and otherwise; but hints which include Miss Leary is where you play offside. I don't let any big lout get my animal, but—"

"Looks like I'd got it right now, guy!" sneered the other, interrupting.

"Oh, no-o, you haven't!" denied Mr. Ward. "But you were just saying some sort of suggestive things about a *lady* —that's why I'm handing you—*this!*"

Smack!

It was as quick as a rattler strikes from her coil, and straight from the shoulder. It carried steam enough to have been the kick of a mule.

"Ugh-f!" said Mr. Gilhooley without emotion—and hit the boards.

It had been too quick for him; it caught him unprepared—also, at a certain sensitive portion of his jaw-bone.

It wasn't a straight K-O; just a knock-down, and it wasn't so much the hurt to his anatomy that kept Windy on the floor, as a sudden yellow-streaked weakness around his heart. He opened his eyes and beheld the hazy form of Mr. Ward up there somewhere above him; then closed them wearily. He was more comfortable there, anyway.

Slat in the mean while was the recipient of much boisterous praise. He had suddenly been elevated to the position of considerable of a hero in the eyes of his associates.

"Ah! Atta-boy, Slatsy!"

"By-y cripes, I didn't think you had it in you, you lanky sonuvagun!"

"You've got th' right idea, Slat, old head!"

"You're there, bo—you there! Shake —you speckled imitation of Bob Fitzsimmons!"

But Mr. Ward ignored it all. He strode out with never a word—looking neither to the right nor the left. His thoughts were elsewhere.

Principally they concerned Katy Leary, and the fact that she had taken him to task, with her peppery Irish tongue, in a manner most vitriolic because of the "spineless" manner he had allowed Windy Gilhooley to crowd him out of his job—rightful or otherwise. Then, too, she had threatened to accept considerably more of Mr. Gilhooley's attentions—Windy had a little "get-up-an'-get to him anyhow."

Slat accepted the information concerning the threatened transfer as he did everything else from her — literally and in silence. If he had understood women a little better he would have at once known that the latter was merely an attempt to stir himself up to the realization that what is worth having is at least worth fighting for. It was her way—the woman's way—of saying:

"If you want me you've got to climb over any intervening ruts, let out a hoot, and get me—'Pike's Peak or bust.'"

Events followed one another with alarming rapidity immediately after the happenings just recorded.

Slat Ward went home to commune with himself concerning the strange ways of the female of the species in particular, and big fat-heads in general. Windy Gilhooley got up, amid the jeers and derisive comments of those gathered in the engineers' room, while for once in his life, at least, he had nothing to say.

He also went out with his eyes fixed straight ahead of him — went out and turned his steps toward the police station. Here he swore out a warrant for

Mr. Slat Ward—on the charge of assault and battery.

"It's the only thing to do with them kind of guys!" he was explaining to a group of railroad men on the corner a couple of hours later. "Got Mr. Slat locked up. A little fine in the morning, and I guess he won't be so gay and reckless with those mitts of his, huh?"

"And if that wasn't a hang of a thing to do!" ejaculated hoghead Crowley, coming up just then. "I'll be teetotally blanked. Hump! Why didn't you put up your dukes to him like a man, you John L. hero?"

"Well," explained Mr. Gilhooley, "he hit me when I wasn't looking in the first place—put me plumb out. But at that I could 'a' got up then, and knocked his block off.

"The only thing that stopped me was that I knew if I got mad I'd hurt him awful bad. I mighty near killed a lad once when I forgot myself and let go one against his beezer. I'm a bad egg when I get started, I am. I have to think of that before I get going."

A shack in the crowd pursed his lips, whistled with the intake and shook his head; then spat disgustedly.

"Suffering cats!" he muttered. "And good men are dying every day; yet they let the likes of you live!"

"Aw, that's all right, feller!" was Mr. Gilhooley's comeback. "I'll show you a thing or two yet. Keep your eyes on Peter."

Miss Katy Leary, in the mean time, had missed out concerning transpiring events. No one had told her that her silent friend was "pinched"—that he had been locked up in the calaboose for hitting Mr. Gilhooley, because of the latter's somewhat dubious insinuations concerning herself.

She didn't know, even as she was pouting inwardly that Mr. Ward had neglected to pay her a promised visit that afternoon, that friends of the disgusted Slat were negotiating with the captain in charge at the local police station for this young gentleman's release on bail.

The latter feat was finally accomplished, and Mr. Ward was a free agent again—for the time at least.

"You show up at court to-morrow morning, young feller, at ten o'clock," said the uniformed official gruffly, as he concluded his instructions, "or you'll forfeit yer bail and go up for contempt—to boot of this here assault charge, too."

Slat nodded meditatively, hesitated; then said:

"Say, cap'n, can you tell me about how much I'm liable to get fined for hitting that big slob?"

"Oh," was the good-humored reply, "I reckon old Judge O'Brien 'd let yer off for a 'V' spot, all right."

"Uh-huh," murmured the Slat celebrity slowly. "That is—if Mr. Gilhooley appears to press the charge?"

"Sure!" assented the man behind the desk.

And Mr. Ward and his followers tramped out.

Immediately upon gaining the street, Slat's first objective point was the roundhouse. Here he scanned the names on the spare board carefully; then sought out the crew-despatcher, while a considerably lengthy consultation followed.

At eight o'clock that night a Burlington extra was made up in the yards of the Inter-Mountain terminal in question. This train would doublehead to Graylock Summit, and Windy Gilhooley was called to fire the helper.

From the Summit the freight would continue to the distant division point, while the second engine cut off and returned light. The first was a two-day trip; the latter a short one.

In getting ready to go out, several small details escaped Windy's attention—things which no one took any pains to enlighten him concerning. In fact, there was a quite apparent subtle sense of prevailing mystery in the air—quite as though the fertile brain of Mr. Slat Ward had been at work to the detriment

of the mental and physical well-being of the plaintiff.

It was not unusual for a helper locomotive to go in on the train; so Windy thought nothing of this fact when such was the apparent case to-night. And it was not, however, till the leading engine cut off and crept into the spur at the Summit, while the second hog took the air and her pumps were cut in on the train-line, that Mr. Gilhooley discovered the fact that somewhere, somehow, he'd got his wires crossed.

"Say, what to blazes?" said he, addressing his remarks to pig-eye "Trailer" Ferguson, who was pulling the latch on the job. "Don't we cut off here, George? I was called for a helper—helper to Summit!"

"Well, I don't know what *you* were called for, old bellyache!" swore the gentleman on the right, whose disposition at the best was nothing very bland. "But this bob-tailed old nanny-goat is hauling our little string of rattlers right through to Burlington! Right through, feller!"

"But I tell you I was called for a helper to Graylock Summit!" howled Windy passionately.

He wasn't very well posted concerning the vagaries of the law, and, under the press of the present alarming circumstances, a delusion appeared in his brain to the effect that *he* might be haled up for contempt of court himself, should it come to pass that he fail to appear anent the prosecution which he had already instituted.

Mr. Ferguson, nevertheless, proved to be a most unsympathetic person.

"How the humped-up trail o' Hinnom should I know what *you* were called for!" he barked—though he did know, very well. "Why don't you go over and put it up to the guy on the other engine? But you've got to hop danged lively because we're going right soon, Lord Kicky-Ack!"

Windy grabbed at this suggestion in a manner likened to a man who clutches at his straw Kelly in a gale of wind. He must go over and enter into arduous controversy with whoever was shoveling diamonds on that other mill. And he did.

He covered the intervening distance between the two freight-haulers with considerable celerity, grunted up through the gangway of the engine in the spur and opened his argument at once. He couldn't see very clearly in the blackness of the cab at first, so he missed out on one or two quite important points.

"Outside here, bum!" he shouted with his customary bluster. "You're in the wrong pew! Get over and take your job to Burlington—"

And then a strangely familiar voice said:

"Why, I thought you were strong for those Burlington liners, Mr. Gilhooley?"

Instantly Windy danced on to the automatic door pedal, then stared in the direction of the figure on the left. The sudden flare of light left no doubt as to who this gentleman was.

"You?" he gasped, taken completely by surprise.

"Yes. Me!" rasped Slat Ward, sliding off the seat as he swung his feet to the deck.

The sudden movement was enough; Windy had no notion of getting caught by a first punch again—furthermore, he was cornered, and almost any breed of animal will fight as a last resort. He flung his whole weight in the direction of the man on the fireman's side — and missed the elusive person who had been seated there by a foot.

Of those who witnessed the affair—and it was surprising how many of the extra's crew happened to be in the immediate vicinity — it was unanimously voted to be an A-1 scrap. Mr. Gilhooley took more of a beating than was expected he would—then quit.

"Now!" panted Mr. Ward. "Who's going to Burlington?"

"I am," admitted Windy, spitting out a mouthful of blood and one perfectly sound tooth.

"And," continued the victor, "do you apologize for what you insinuated about Miss Leary?"

"Yea-ah," said the other mournfully, "I do."

Then as an afterthought:

"But you wait till I get back—"

"Oh, that 'll be all right," grinned Slat cheerfully. "You won't be back in time to prosecute me to-morrow morning; and after that you've got nothing on Slat—not a thing. *You* started to-night's little shindig—and I've got witnesses to prove it.

"The minute you get back, too, you're the one who's going to get jugged this trip. I guess, too, probably they'll make it a couple of counts seeing that this is the second time you've been mixed up in a fight."

But Windy Gilhooley never went back. He quit the Inter-Mountain at Burlington.

The last chapter—as has been her inalienable right for a considerable length of time—belongs to the woman.

Miss Katy Leary received several very vivid and eloquent accounts of the whole affair; but she never got them from Slat himself, for he always lapsed into interminable silences concerning matters which centered around his own particular sphere of activity.

He did, however, visit the rosy lady who presided at the news-stand, and later was invited to her home. And as time wore on and the acquaintanceship advanced considerably, he at length mustered courage to ask her if she thought she liked him as well as she had Mr. Gilhooley.

She laughed a little, then; not much, though, for after all it was a pretty serious thing when Mr. Ward got as personal as this. He must not be disheartened after such a brilliant attempt at mastering the rudiments of this time-worn game. So she smiled a little and blushed a little, and said:

"Yes, Slat, I do—and then some! *You're* a man!"

Then a twinkle crept into her dark eyes, as she concluded:

"And when I marry I'm not going to get hitched up to any windbag—because I reckon I'll do about all the talking that's necessary around Katy's hearthstone. Hubby's job will be just to listen to the helper's exhaust."

And Slat believed it, and was quite content that it should be so.

HILLIGRAMS.

HERE are a few sententious sayings by the late James J. Hill as they appear in the *Express Gazette*, which gives the empire-builder's speeches as the source from which they were obtained:

The spur of necessity is a rich heritage.

The morning hours are the best hours of each day.

If a man is not honest, he is bound to fall eventually.

Railroading is not like politics; the competent man wins.

Crown your smallest actions with the halo of earnestness.

I've made my mark on the surface of the earth, and they can't wipe it out.

Truthfulness does not alone consist in telling the truth, but more often in doing it.

Opportunity comes sometimes disguised and surrounded by hard work and adverse circumstances.

A man must make up his mind that if he takes another man's dollar, he must give back to him an honest return.

Confidence is the basis of a stable business. If you do not trust yourself, who will? But be sure of your ground for confidence.

Men who succeed are not magicians, but you will probably find they have a capacity for hard work. If causes are created, effects must come.

Our white bread is like the lotus; no nation that once eats it will change to poorer diet. I will make wheat flour as cheap as rice for the millions of the Orient, and our farmers will profit by a new demand.

MERLIN'S MEN.

BY REGINALD WRIGHT KAUFFMAN.

Daily to the city
On the 8.15!
Think it is a pity?
Saddest sight you've seen?

MEN behind their papers, men behind cigars;
Snorting engine spouting soot, rather noisome cars!
Each one in a hurry; no one glad to go;
Full of bolted breakfast-food, they must hustle so;
Darting from the family and the stucco home
Down the thousand iron roads leading into Rome;
Everybody traveling with the same intent:
Speeding to the city to earn suburban rent.
All romance is dead in us; we are mere routine,
Going to
Gomorrah
On the
8.15?

WELL, *you* couldn't guess it! *You* could never know,
You folks born to money made so long ago.
These are our romances daily fresh unfurled:
We're the new knights-errant of a modern world!
We encounter ogres eager for our bones,
Meet in joust and tourney over telephones;
At the desk and ticker monsters brave our might;
Dragons storm the ledgers, griffins offer fight.
We've a quest to follow worthy any bard;
Each one has a castle, each a trust to guard;
Each must wage his battles, keep his buckler clean—
Why, *freighted* with
Adventure
Is the
8.15!

WAIT until the evening, when the rush is there;
See us dashing outward toward the country air:
All our cares behind us in the working hours,
Only rest ahead now—open fields and flowers;
There the office-buildings tower turgid, thick;
Here are trees upspringing, perfumed, virile, quick.
Let us mix a metaphor: forward at a trot,
Here we come, rewarded, back to Camelot;
We have helped a little to run the Big Machine,
So we're going from
Gomorrah
By the
5.19

Say, is it a pity?
All roads lead from Rome;
Watch us quit the city
On the
Through-train
Home!

By the Light of the Lantern

Ask us what you want to know

WE want to be as useful as possible to our readers, but, because of the great popularity of this department, we are obliged to impose certain restrictions. It is limited to the answering of questions of an informative, technical, or historical nature concerning the railroad business and allied occupations only. We cannot answer requests for positions or give information regarding employment. All letters should be signed with the full name of the writer, as an indication of his good faith. We will print only his initials. The editor begs that readers sending in questions will not be disappointed if the answers do not appear as early as expected. It frequently takes weeks to secure correct answers, owing to the complexity of the questions. All questions are answered free of charge. The editor earnestly requests his readers to bring immediately to his attention any errors they may find in this department. He reserves the right to refrain from answering any question.

INDUSTRIAL SCHOOLS.

C. W. B., Matoaka, West Virginia.—Both the Westinghouse Electric and Manufacturing Company and the General Electric Company have apprentice schools for young men in their service. We are unable to give you in these columns the details in regard to the rates of pay, *et cetera,* but suggest that you communicate with the companies referred to, and they will probably furnish particulars.

We believe that the majority of the young men are selected on completion of courses in various technical institutions.

In regard to a study of mechanical drawing, nearly all technical schools teach this subject, and there are also correspondence schools offering courses in drawing. One might secure employment as an apprentice or bench-boy in some drafting-room, and in this way become a draftsman.

WATERING ON THE FLY.

C. F. V., Carlton, Oregon.—To avoid frequent stops for water, locomotives such as the one you refer to are sometimes provided with what is call a water-scoop for taking water while the engine is running, from a trough laid between the rails, and sometimes called a track-tank.

The water-scoop consists of a bent tube attached to the under side of the tender tank, and passing up through the tank and turned over at the top so as to discharge the water downward.

The lower end of the bent tube or scoop has a joint or hinge so that it can be lowered into the trough and the lower end will then dip a few inches into the water. The lever for operating the scoop is worked by hand or by compressed air applied in a cylinder whose piston-rod is connected to the mechanism for raising or lowering the scoop.

The water is forced through the scoop-pipe into the tender when the scoop moves through the trough at a speed of from 25 to 40 miles per hour.

RAILWAY EMPLOYMENT.

H. W., New York, and other readers.—There is scarcely an issue of the RAILROAD MAN'S MAGAZINE that does not contain in this column some reference or answer in regard to the necessary qualifications for railway employment as firemen, brakemen, *et cetera.* Recently the number of questions have been particularly large and the following will give the particulars for all correspondents and at the same time interest those of our readers that contemplated asking questions along this line.

In applying for railway employment an applicant is furnished certain blanks to be filled out, giving general information as to his age, experience, previous position held, and references in regard to character, *et cetera.* Some roads have additional forms for special information for the particular branch of the service the applicant may desire to enter.

If the work applied for demands such, an applicant is examined by the company's surgeon for color-perception and other necessary physical qualifications. These physical and color tests are not used for applicants seeking employment as general officers or as clerks or skilled

mechanics in the various trades, whose qualifications are the same as in the business world generally.

For the unskilled laborer the sole qualifications are physical health and a willingness to work. As a general thing the railroad demands that all employees except unskilled laborers have at least a good common-school education.

The greater part of the employees are expected to work their way up from the lower grades of the service, and thus familiarize themselves by actual experience in the service with the needs of the better-paid positions for which they may have better aptitude and natural ability.

Freedom from the use of intoxicants is now generally demanded. Unless one has previous railway experience it is now difficult for any one over thirty-five years of age to enter railway service.

The following are the usual requirements for firemen and brakemen: Not under 21 or over 27 years of age. Physically robust and of good health. At least a common-school education.

Habits, free from dissipation and of good character. Perfect sight and hearing.

The stringent physical requirement as to health, sight, and hearing are not demanded for positions as clerks, mechanics, telegraph operators, *et cetera;* for such positions the requirements are about the same as in the business world generally, the only thing demanded being competency, which is demonstrated by trial.

Please remember, engineers are promoted from firemen. Conductors are promoted from brakemen, and station agents are promoted from clerks, telegraph operators, *et cetera.*

NUMBER OF WORLD'S RAILWAYS.

C. R. L., Sabinal, Texas.—No reliable statistics available gives the number of individual railways in the world. However, from the best data at hand, what might be said to be an accurate estimate is that there are 1,944 steam railways in the world, over 1,000 of which are in the United States.

CHIEF SIGNAL OFFICER, U. S. A.

H. W. H., Indianapolis, Indiana.—We would suggest that you communicate with Brigadier-General George P. Scriven, Chief Signal Officer, United States Army, Washington, District of Columbia.

B. R. T.'S HEADQUARTERS.

J. J. C., New York.—The headquarters of the Brotherhood of Railroad Trainmen is at Cleveland, Ohio, address American Trust Building. The president of the Grand Lodge is W. G. Lee and the general secretary-treasurer is A. E. King, both with offices at the above address.

ACCIDENTS ON STEAM ROADS.

H. B. I., Durant, Oklahoma.—From the latest statistics available the amount paid in the year of 1913 by the railroads of the United States in death and accident claims exceeded $31,000,000. The following table as to the number killed and injured and the causes of such accidents are for the year of 1914:

	Killed.	Injured.
Passengers—In train accidents	85	7,001
Other causes	180	8,120
Total	265	15,121
Employees on duty—In train accidents	452	4,823
In coupling accidents	171	2,692
Overhead obstructions, etc.	89	1,490
Falling from cars, etc.	497	14,563
Other causes	1,314	27,273
Total	2,523	50,841
Employees not on duty—		
In train accidents	5	117
In coupling accidents	0	2
Overhead obstructions, etc.	3	5
Falling from cars, etc.	54	370
Other causes	265	603
Total	327	1,097
Other persons—not trespassing—In train accidents	9	148
Other causes	1,298	5,827
Total	1,307	5,975
Trespassers—In train accidents	75	178
Other causes	5,396	6,176
Total	5,471	6,354
Total accidents involving train operation	9,893	79,388
Industrial accidents to employees not involving train operation	409	113,274
Grand total	10,302	192,662

We must ask our readers to analyze carefully the foregoing table before drawing the con-

clusion that our American roads are not safely operated. It will be noted that only 5 per cent of the reported fatalities were directly chargeable to some defect or mischance in railway operation, and that the balance was due to some mischance on the part of the individuals themselves.

The most appalling figure in the fatality column, 5,471 trespassers killed, over 50 per cent of the total fatalities, shows the utter disregard of the warning not to trespass on railway property.

SUPERINTENDENTS.

H. M. R., Mena, Arkansas.—At Los Angeles, California, superintendents of the Pacific Electric Railway are A. C. Bradley and O. P. Davis. The division superintendents at this point are, on the Los Angeles and Salt Lake Railroad T. P. Cullen, and on the Southern Pacific W. H. Whalen. (2) In regard to your other question relative to brakemen see our answer to H. W., New York, in this issue.

TENSILE STRENGTH.

W. E. T., Cleveland, Ohio.—The tensile strength of a boiler, usually expressed in pounds per square inch, is the stress a boiler is capable of resisting. It represents the cohesion or force by which the molecules of the steel are held together and resist being torn asunder.

Good wrought-iron boiler-plates have a tensile strength of 50,000 pounds per square inch, and mild steel about 60,000 pounds.

LARGEST LOCOMOTIVE.

(2) The largest locomotive in the world is an Erie triplex compound of the Matt H. Shay group, weight 860,000 pounds. If reports are correct one of these monster engines of the triplex design is now under construction for the Virginian Railway.

SOUTHERN INDIANA RAILWAY.

(3) The Southern Indiana Railway was sold under foreclosure the latter part of 1910. This property and that of the Chicago Southern Railway were subsequently acquired by the Chicago, Terre Haute and Southeastern Railway. This latter road has in operation 362 miles, 73 locomotives, and 9,406 cars.

RESISTANCE ON CURVES.

R. L., Bedford Massachusetts.—The construction of the road-bed, speed, length of train, weight of cars, and various other conditions make it impossible to give an exact rule for computing the resistance due to curves of any given radius.

It is generally considered, however, that the resistance amounts to from .7 of a pound to 1.0 pound per ton per degree of curvature, the lower figure being used for large capacity cars and the higher figure for smaller capacity cars, as in the latter case there are more wheels and axles per ton of weight than in the former.

QUEBEC CENTRAL RAILWAY.

M. V. B., Montreal, Quebec.—The Quebec Central Railway was leased several years ago to the Canadian Pacific Railway for a term of 999 years. All of the other roads that you mention are independent systems.

MASTER MECHANICS.

J. W. S., Fort Bliss, Texas.—On the Texas and Pacific the master mechanics and their location are: T. A. Albright, Marshall; G. W. Deats, Fort Worth; W. E. Maxfield, Big Spring; all in the State of Texas, and W. J. McGee, Gouldsboro, Louisiana. On the Galveston, Harrisburg and San Antonio Railway the general road foreman of engines is E. F. Boyle, headquarters at Houston, Texas.

G. T.'S MASTER MECHANICS.

D. P. S., Potsdam, New York.—On the Grand Trunk Railway in the Province of Ontario, master mechanics are: At Allandale, J. R. Donnelly; at Toronto, W. C. Sealey; at Montreal, T. McHattie; at Stratford, R. Paterson.

ROCK ISLAND LINES.

F. E. W., Port Morris, New Jersey.—Our answer in regard to the Rock Island system to which you refer is correct. The Chicago, Rock Island and Pacific Railway Company operates independently its lines of railways, and in addition is interested through ownership, directly or indirectly, of at least a majority of the capital stock of certain subsidiary companies, each of which operates its property independently.

The Chicago, Rock Island and Pacific Railway Company and its subsidiary the Chicago, Rock Island and Gulf Railway, comprise what is known as the Rock Island Lines. While the Chicago, Rock Island and Gulf Railway is operated independently, the entire capital stock is owned by the Chicago, Rock Island and Pacific Railway Company.

Car-reporting marks are not necessarily an

indication of the roads comprising a certain system of railways.

BOOKS ON SIGNALS.

H. W., South Bend, Indiana.—Books on signals, train-rules, *et cetera*, are furnished by the McGraw-Hill Book Company, 239 West 39th Street, New York, and the Angus Sinclair Company, 114 Liberty Street, New York. Suggest that you write for a descriptive catalogue of the books of the concerns mentioned.

SALT LAKE CITY'S LINES.

"REFERRING to your answer in the October issue in regard to the roads that enter Salt Lake City, Utah," writes W. H., Jr., of Waynesburg, Pennsylvania. "I have railroaded out of this point for years, but never heard of the Salt Lake and Utah Railroad or the Salt Lake and Los Angeles Railway given in your answer. I would like to know where the roads mentioned run to."

Both these lines are interurban electric lines. The Salt Lake and Utah Railroad operates about 26 trains daily, with daily freight service, between Salt Lake City and Lehi, American Fork, Pleasant Grove, Provo, and intermediate points.

The Salt Lake and Los Angeles Railway operates about thirty trains daily during the summer season between Salt Lake City and Saltair, a summer resort. During the rest of the year there are only about four daily trains between the points mentioned.

LOCOMOTIVE PHOTOGRAPHS.

A. H. B., Derby, Connecticut.—We do not know where you could obtain photographs of old diamond-stack locomotives. We know of a number of private collectors of photographs of such engines, but do not know of a concern handling them for sale.

EMPLOYEES' PASSES.

H. L. M., Portland, Oregon.—The regulations governing the issuance of employees' passes vary with the different roads, and we can only suggest that you consult your superior officer in regard to the subject.

The usual custom is that local trip passes are issued to employees after a short period of employment, say six months, and even then the roads place a limit on the number of these that may be obtained in a specified period.

On the larger systems after several years of employment annual passes for the local division are sometimes issued, and under certain conditions trip passes over other than their own lines may be obtained, the latter beng really an exchange of courtesies from one road to the employees of another.

The usual practise is to make application through your immediate superior officer who will probably know the exact regulations on the road where you are employed.

WABASH IN CANADA.

J. T. G., Fort Wayne, Indiana.—Does any part of the Wabash Railroad enter Canada by way of Windsor, Ontario, and run east as far as Buffalo, New York; or does any part of the Wabash enter Canada at all?

The lines to which you refer—from Detroit, Michigan, to Black Rock Station, New York, and from Welland Junction, Ontario to Suspension Bridge, New York, 246 miles—are really the Grand Trunk Railway of Canada. The railway lines and ferries of the Grand Trunk Railway between the points mentioned above are used by the Wabash under a joint operating-agreement; the Wabash pays an annual rental and also a proportionate share of the cost and maintenance and operation for the use of these lines.

NORDING AUTOMATIC STOP.

H. F. Z., Denver, Colorado.—Please tell me if the Nording automatic stop has been installed on any of the railroads and if it was a success?

The editor must confess that he has never heard of the Nording automatic stop. If it has been successfully installed on any road he would probably know of it. Can any of our readers help us over this one?

NEW YORK-CHICAGO TRAINS.

G. W. L., Scottsbluff, Nebraska.—We are not certain whether you refer to the fastest scheduled trains between New York and Chicago or the fastest time in which the run has been made by a train. Both the Twentieth Century Limited of the New York Central, and the Broadway Limited of the Pennsylvania are at present scheduled 20 hours for the run between the two cities.

The fastest recorded runs between these two points was made on the New York Central. June, 1905, a train ran between these two points, 960.5 miles, in 15 hours and 56 minutes or at the rate of 60.28 miles per hour.

Again in March, 1909, a train between these two cities traveled 965 miles in 15 hours and 43 minutes or at the rate of 62.54 miles per hour. In both instances the time given is exclusive of stops.

THE BARNUM FLIER.

S. G. R., Natal, South Africa.—We agree with you that the illustration that appeared on page 402 of the July, 1916, issue of the RAILROAD MAN'S MAGAZINE looks like one of the old engines, with slight alterations, such as were used on the New York and Chicago elevated lines, but it does not follow that the locomotive of the "Barnum Flier" was not in reality obtained from the Southern Pacific Company as stated by the author of the article to which you refer.

Engines of this design and known as the "Forney" type were the most successful suburban engines of their day. Their use was not limited to the elevated lines by any means.

SECURING A PATENT.

S. H. D., Detroit, Michigan.—I am working on a model that applies to freight cars and would like to know how to proceed to secure a patent. Is it not possible to secure a patent of my idea while completing a model. What is the cost of such proceedings, and to whom should I apply?

An inventor wishing to file an application for a patent, may secure from the Commissioner of Patents, Washington, District of Columbia, a copy of the Rules of Practise, which contains forms and instructions and which will be sent on request.

It is advisable, however, that the services of a competent registered patent attorney be secured, as the value of patents depends largely upon the skilful preparation of the specifications and claims.

Applications for patents must be made in writing to the Commissioner of Patents.

The applicant must file in the Patent-Office a written description of the invention or discovery, and of the manner and process of making, constructing, compounding, and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art or science to which it appertains, or with which it is most nearly connected, to make, construct, compound, and use the same; and in case of a machine, he must explain the principle thereof, and the best mode in which he has contemplated applying that principle, so as to distinguish it from other inventions, and particularly point out and distinctly claim the part, improvement, or combination which he claims as his invention or discovery.

The specification and claim must be signed by the inventor.

When the nature of the invention admits of drawings, the applicant must furnish a drawing of the required size, signed by the inventor or his attorney in fact. The applicant, if required by the Patent-Office, shall furnish a model of convenient size to exhibit advantageously, the several parts of his invention or discovery, but a model should not be sent unless first called for by the Patent-Office.

The fees which must be paid in advance are: On filing each original application for a patent, $15; and on the issuance of each original patent, $20 additional.

In design cases: For three years and a half, $10; for seven years, $15; for fourteen years, $30.

For full particulars secure the copy of the Rules of Practise from the Commissioner of Patents. It is not necessary to send stamped envelope or stamps for replies from this office of the government as stamps are not required on mail-matter emanating from the Patent-Office.

HORSE-POWER OF AN ENGINE.

B. P., Cleveland, Ohio.—A horse-power as originally promulgated by James Watt, the inventor of the modern steam-engine, consists in moving 33,000 pounds one foot in one minute. In calculating the horse-power of an engine the following is the common rule:

Multiply the area of the piston in inches by the mean pressure per square inch, and by the piston speed in feet per minute, and divide the product by 33,000. The quotient will be the indicated horse-power.

The mean, or average, pressure on a double-cylindered locomotive will be about eighty-five per cent of the boiler pressure. That includes both cylinders. A further deduction of ten per cent should be made to allow for friction.

THE WHY OF IT.

E. M. Y., Montreal, Quebec.—You are only one of the many that have asked the editor of this department to explain why only seventeen out of every hundred firemen ever become engineers as stated on page 218 of the October, 1916, issue of the RAILROAD MAN'S MAGAZINE.

Years ago, on a certain railroad, where the system was in vogue to employ men for round-house work and cleaners who were in line for promotion to locomotive firemen and engineers, *et cetera*, their seniority ranking from the time

that they were employed by the railroad company, an investigation was made to discover approximately the number of men who became, in this manner, apprentice engineers who reached the goal of their ambition, and successfully ran an engine twelve months.

To the great surprise of those investigating, it was discovered that over 50 per cent of the young men attracted to the calling of locomotive engineer, for various reasons, fell by the wayside in less than six months.

Many who had the impression that the duties of a locomotive fireman consisted largely in ringing the bell and looking out the window found to their surprise that the work was arduous and that the vocation demanded physical strength and endurance beyond their dreams, that the work was also dirty, and that the calling, on the whole, was unsuited to their tastes.

Ten per cent more in less than three years failed because of their defects of vision and other physical inefficiencies, and over 20 per cent failed to pass the examinations subjected to them, although they were very elementary, leaving only 20 per cent that gained the right-hand side.

Three-fourths of these, through making mistakes, ardent and other causes, were dismissed before they had successfully run an engine one year, leaving as a residue of this sifting process, five per cent successfully running the gantlet and master of an engine for twelve months.

Since that time the system of progressive examination has become the vogue, and on the majority of our trunk lines when a fireman assumes the work of firing a locomotive, he is informed that he will be called up at the end of twelve months and required to pass his first year's preliminary examination.

If he passes this examination, at the end of the next twelve months, or, roughly speaking, when he has been twenty-four months in engine service, he is called upon to pass his second year's examination, and at the end of thirty-six months' service, on the majority of systems, he is called upon to pass his third year's, or a final examination, after which he ranks as an engineer, and takes his seniority from that time on the engineer's list, although in many cases he may still fire an engine indefinitely until such times as a vacancy occurs.

It is generally arranged that, when a fireman fails on his first year's examination, and shows utter inability for the position in which he is in training, he is dismissed or put at some other work outside of the line of promotion.

Very little trouble, as a rule, occurs with the second year's examination, but the crowning test in the life of an embryo engineer, occurs when he is called up for his third examination. Customarily, when the candidate for the position of locomotive engineer fails to pass, he is put back for six months, and if at the expiration of that period he fails to pass the required examination he is dropped from service.

READING CLASSIFICATION.

J. J. C., New York, New York.—The following is the method of locomotive classification as used on the Philadelphia and Reading Railway:

Class.	Type.	Wheel Arrangement.
A	4-Wheel Switcher	0-4-0
B	6-Wheel Switcher	0-6-0
D	American	4-4-0
E	8-Wheel Switcher	0-8-0
F	10-Wheel (old class)	4-6-0
G	Pacific	4-6-2
H	10-Wheel (old class)	4-6-0
I	Consolidation	2-8-0
K	American	4-4-0
L	10-Wheel	4-6-0
M	Mikado	2-8-2
P	Atlantic	4-4-2
Q	Suburban	4-4-4

ROADS THAT ENTER PITTSBURGH.

E. G. S., Falling Waters, West Virginia.—The following roads enter Pittsburgh, Pennsylvania: Baltimore and Ohio; Buffalo, Rochester and Pittsburgh; Pennsylvania; Pittsburgh, Allegheny and McKee's Rocks; Pittsburgh and Lake Erie; Pittsburgh, Cincinnati, Chicago and St. Louis; Wabash-Pittsburgh Terminal Co.; West Side Belt Railroad.

RAILROAD TELEGRAPHERS.

S. J. W., Vancouver, British Columbia.—What is the speed required to pass examinations in railroad telegraphy for this province?

Cannot say. As a usual thing a man's competency in this respect is generally demonstrated by trial.

RAILROAD PRESIDENT.

F. D. C., Cincinnati, Ohio.—The San Pedro, Los Angeles and Salt Lake Railroad has changed its name and is now known as the Los Angeles and Salt Lake Railroad. The president of this road is W. A. Clark, whose offices are at No. 20 Exchange Place, New York, New York.

We do not know the New York and Western. If you mean the New York, Ontario

and Western Railway, J. B. Kerr is president, office at New York, New York.

ABOUT PROMOTION.

H. P. M., Somerville, Massachusetts.—It does not make any difference what road you refer to, engineers or firemen can be promoted only as vacancies occur or as the service demands. There can be no stated period when these things happen. Read our answer to H. W., New York, New York, in this issue.

A. L. COMPANY'S PLANTS.

T. S. H., Belmar, New Jersey.—The following is a list of the various plants of the American Locomotive Company with the title and location of each:

Schenectady Works...	Schenectady, New York.
Brooks Works.....	Dunkirk, New York.
Richmond Works....	Richmond, Virginia.
Rogers Works.....	Paterson, New Jersey.
Pittsburgh Works....	Allegheny, Pennsylvania.
Cooke Works.....	Paterson, New Jersey.
Rhode Island Works..	Providence, Rhode Island.
Dickson Works.....	Scranton, Pennsylvania.
Manchester Works....	Manchester, New Hampshire.
Montreal Works.....	Montreal, Canada.

PENNSYLVANIA'S PACIFIC.

(2) Taking locomotive No. 1,737 of the Pennsylvania as an example for the Pacific type passenger engines, the following are the general dimensions: Cylinders, 27 by 28 inches; steam pressure, 205 pounds; diameter of drivers, 80 inches; tractive effort, 41,845 pounds.

Heating-surface: Tubes, 3,746 square feet; firebox, 288.6 square feet; total, 4,035.4 square feet.

Superheater surface, 1,153.9 square feet. Wheel-base: Driving, 13 feet 10 inches. Total wheel-base, 36 feet 6 inches.

Weight on drivers, 201,800 pounds. Total weight of engine, 308,900.

TECHNICAL PUBLICATIONS.

G. W. M., Brooklyn, New York.—Your question is not sufficiently explicit. From time to time there is a demand for locomotive firemen in the vicinity of New York City, and the best procedure for a graduate of an educational association such as yourself would be to file an application with the various roads for a position as such.

We do not know what you mean by a list of publications that will help you to get a job firing. If you mean a list of magazines that will keep you informed on subjects relating to locomotive operation, *et cetera*, would suggest *Railway and Locomotive Engineering*, 114 Liberty Street, New York, or the *Brotherhood of Locomotive Firemen and Enginemen's Magazine*, published at Columbus, Ohio.

The annual subscription price of the former is $2, and the latter $1.50.

LENGTH OF RAILS ON CURVES.

E. A. M., Jr., Jersey City, New Jersey.—Both you and your friend are wrong regardless of your shoe-string experiment. We have previously explained in this department why the outside rail in a curve is longer than the inner rail.

There are a number of methods for finding the difference in the length of the rails. For the easier curves that are laid to exact gage the difference is sometimes taken as 1 and 1-32 inches per degree of curve, per 100 feet.

For example, to find the difference in length between the inner and outer rails on 600 feet of 10 degree curve, 10 x 1 1-32 x 6=5.124 feet= 5 feet 1½ inches.

(2) Divide the difference from center to center of the rails (ordinarily 4 feet 11 inches)= 4.9167 feet by the radius of the curve, and multiply the result by the length of the curve in feet. Example the same problem 600 feet of 10 degree curve 4.9167÷573.7 x 600=5.142 feet=5 feet 1¾ inches.

(3) Multiply the excess for a whole circumference by the total number of degrees in a curve, and divide the product by 360. The excess for a whole circumference, no matter what the degree of curve, is equal to twice the distance between the rail centers multiplied by 3.1416.

Where the distance between the rail centers is 4 feet 11 inches, the excess for a whole circle is 30.892 feet.

Same example, 600 feet of 10 degree curve, 30.892 x 600÷360=5.148 feet=5 feet 1¾ inches.

On sharp curves where the gage is widened or for narrow gage lines use the second method or prepare a table by the third method.

WHEELS ON CURVES.

(2) We have repeatedly explained in this department the action of a pair of wheels in rounding a curve. See our answer to A. C. C., Wash-

ington, page 109 of the September, 1916, issue of the RAILROAD MAN'S MAGAZINE.

PENNSYLVANIA SYSTEM.

H. Y. P., Youngstown, Ohio.—We could not publish in this department a complete list of all the roads that have been consolidated to produce what is now known as the Pennsylvania System. However, the following is a list of the principal divisions with the mileage of each:

Baltimore and Sparrows Point Railroad	5.43
Baltimore, Chesapeake and Atlantic Railway	87.66
Barnegat Railroad	8.15
Cape Charles Railroad	9.52
Cherry Tree and Dixonville Railroad	38.95
Cornwall and Lebanon Railroad	24.84
Cumberland Valley Railroad Lines	162.11
Eastern Pennsylvania Division, Pennsylvania Railroad	1,253.90
Erie Division, Pennsylvania Railroad	605.40
Long Island Railroad Lines	394.66
Maryland, Delaware and Virginia Railway	78.43
Monongahela Railroad Lines	65.17
New Jersey Division, Pennsylvania Railroad	460.74
New York, Philadelphia and Norfolk Railroad	112.00
Northern Central Railway Division	448.09
Northern Division	774.36
Pemberton and Hightstown Railroad	24.37
Philadelphia and Beach Haven Railroad	12.80
Philadelphia, Baltimore and Washington Railroad Division	697.81
Philadelphia Terminal Division, Pennsylvania Railroad	48.96
Rosslyn Connecting Railroad	2.69
Susquehanna, Bloomsburg and Berwick Railroad	41.83
Union Railroad Company of Baltimore	9.50
Washington Terminal Company	2.13
West Jersey and Seashore Railroad Division	337.48
Western Pennsylvania Division, Pennsylvania Railroad	710.35
Winfield Railroad	9.16
Total lines east of Pittsburgh and Erie	6,426.49
Akron and Barberton Belt Railroad	23.40
Belt Railway of Chicago	21.35
Calumet Western Railway	3.42
Central Indiana Railway	117.58
Cincinnati, Lebanon and Northern Railway	51.71
Grand Rapids and Indiana Railway Lines	568.36
Indianapolis Union Railway	15.11
Lake Erie and Pittsburgh Railway	27.79
Ohio River and Western Railway	110.75
Pennsylvania lines west of Pittsburgh, Central System	675.62
Pennsylvania lines west of Pittsburgh, northwest system	1,003.40
Pennsylvania lines west of southwest system	1,417.77
Pennsylvania Terminal Railway	4.15
Pittsburgh, Chartiers and Youghiogheny Railway	19.85
Sharpsville Railroad	17.75
Terminal Railroad Association of St. Louis	65.28
Toledo, Peoria and Western Railway	233.57
Toledo Terminal Railroad	31.27
Tylerdale Connecting Railroad	1.32
Union Depot Company (Columbus, Ohio)	0.24
Vandalia Railroad Lines	851.53
Waynesburg and Washington Railroad	28.16
Wheeling Terminal Railway	9.65
Zanesville Terminal Railway	4.40
Total lines west of Pittsburgh and Erie	5,303.43
Grand total miles	11,729.92

(2) For answer to your other question see our reply to H. W., New York, New York, in this issue.

SOUTH AMERICAN RAILWAY MEN.

J. McG., San Francisco, California.—There is no list published that we know of that gives a list of the representatives of South American railways in the United States. The only thing that we can suggest is that you communicate with the consuls general representing the South American governments in this country.

KATY OFFICIALS.

R. H., Cassville, Missouri.—On the Missouri, Kansas and Texas Lines at Parsons, Kansas, W. H. Maddocks is assistant superin-

tendent of motive power, and R. R. Bates is shop superintendent.

BAGGAGE AGENTS.

W. S. B., Belmont, Massachusetts.—The requirements of applicants for the position of brakeman is given in our answer to H. W., New York, in this issue. If there is a school or any other organization that offer to teach men to become baggage agents or baggage-masters we do not know of it.

All of the men occupying positions of this kind have spent a number of years in the service in some minor capacities, where from experience, *et cetera*, they eventually qualified for the positions they now occupy.

Telegraphic & Telephonic

IF there is anything you want to know about the telegraph, telephone, or radio telegraphy—if you have an operating problem that puzzles you—if you want to discuss a question of theory—write the RAILROAD MAN'S MAGAZINE. We have engaged a technical expert who is one of the leading authorities of the country on these subjects. Ask him. He knows!

NUMBER SIGNALS.

C. L. K., Sleepy Creek, West Virginia.—On land lines, both railroad and commercial, where the Morse alphabet is used, the following signal abbreviations are in common use:

1. Wait a minute.
4. Where shall I go ahead?
5. Have you a message for me?
7. I have a message for you.
8. Wait, I am busy.
9. Wire message, or train order.
13. Understand. (Do you 13?) (I 13.)
25. I am busy on another wire.
30. Finished. Or, Good Night on press report.
73. My compliments to you.
92. Deliver.

The telegraph departments of railroads have in many instances assigned special meanings to certain figures and numbers, in addition to those listed above.

110 a.c. RINGING.

R. A. S., Buffalo, Missouri.—If the 110 volt, a.c., lighting current is of sixty-cycle frequency, the alternations would be considerably too rapid to operate ordinary telephone bells satisfactorily. Also, it is bad practise to subject conductors in telephone cables to a pressure of 110 volts a.c.

The usual practise is to employ the 110-volt current to operate a small motor-generator set, the generator end of which may have an output of 24 volts or 50 volts at a low frequency. For a small exchange it is an easy matter to equip an ordinary magneto with belt pulleys so that the magneto may be driven by a small 110 volt, a.c., fan motor.

RAILROAD SALARIES.

J. L. D., Boyertown, Pennsylvania.—Salaries paid telegraphers are, in the average, highest on the following-named railroads: Grand Trunk Pacific; Canadian Pacific; Northern Pacific, Union Pacific, and Denver and Rio Grande. The two first-named lines are in Canada.

TRANS-ISTHMIAN DUCT LINE.

G. H. S., Washington, District of Columbia.—Along the Panama Canal, between Colon and Panama, a four-compartment duct has been laid underground. This duct contains three cables, one of which is a paper-lead telephone cable; one a taped and braided railroad signal service cable, and one a taped and braided Kerite telegraph cable used by the Central and South American Telegraph Company to join its submarine cables in the Atlantic to the cables extending south along the west shore of South America.

TELEGRAPH SCHOOL.

H. E. M., Casa Verdugo, California.—if you can secure admittance to the telegraph school operated by the Santa Fe Railroad Company at Los Angeles you will undoubtedly be well treated and given every opportunity to

learn the business. First, make sure that you would rather be a telegrapher than anything else, and then take up the work determined to make a success of it.

TELEPHONE VS. TELEGRAPH.

FRANK DOYLE, Indianapolis, Indiana.—It is highly improbable that the telephone will ever take the place of telegraph systems in handling the bulk of long-distance commercial traffic, unless electrical engineering makes great advances in fields that are now only dimly guessed at.

RADIO DETECTORS.

G. L. L., Memphis, Tennessee.—Galena crystals used in radio receivers must be carefully selected and tested before much dependence is placed upon their reliability. Galena can be purchased at 50 cents per pound, but it often happens that not more than five or six sensitive crystals are found in the entire pound of material.

In order to get started it might be worth while to buy two or three tested crystals from a wireless supply house.

EXPENSIVE "LOCAL" BATTERY.

M. J. L., Kansas City, Missouri.—At the present high cost of gravity-battery material it entails an expense of about $4 per year per cell to maintain gravity battery. As a substitute for gravity battery the dry cell is now being extensively employed to operate telegraph sounders.

A telegraph sounder recently invented by A. J. Eaves, of New York, is designed for dry-cell operation. In this sounder the electro-magnets do the work done by the retractile spring in an ordinary sounder, while the spring does the work previously done by the electro-magnets.

When this sounder is connected in series with four or five dry-cells the connection with the relay is made via the relay armature and the back-stop contacts of the relay. The result is that when the armature of the relay is "closed" the battery circuit through the electro-magnets of the sounder is opened, permitting the spring to move the sounder armature into the closed or signaling position.

When the relay armature, in response to the opening of a main-line key, is withdrawn into contact with its back-stop, the sounder battery circuit through the sounder electro-magnet is closed, resuling in the sounder armature being drawn into contact with its back-stop.

So far as the operator is concerned the signals sound the same as when an ordinary sounder is used.

The efficiency of the instrument lies in the fact that current from the dry-cell local battery is consumed only when the main line is open in the act of signaling, or from other cause. While the main line is idle, and closed, the sounder armature is held in the closed position by the action of the spring.

SOUTH AMERICAN TELEGRAPHS.

HARRY V. M., Boston, Massachusetts.—In the United States of Colombia, South America, there are 550 telegraph stations, some of the larger offices being located in the cities of Cartagena, Cucuta, Bogota, Popayan, and Bonaventura. Mr. Saturno Zapata is chief inspector, and Mr. Adolpho Concha inspector of telegraphs, the headquarters office being located at Bogota.

In Peru the telegraph headquarters is in the city of Lima. The Peruvian Telegraph Administration issues a periodical with the title *Revista Telegrafica,* edited by Mr. Wilildoro Botetano.

SHORT LINE TROUBLES.

NORMAN G., Goldthwaite, Texas.—If the practise sets you have are each wound to ten ohms, the line two blocks long should work satisfactorily with ten dry-cells or ten gravity-cells.

With a 100-ohm relay at your end and a 100 or 150 ohm sounder or relay at the other end the line should work satisfactorily with ten cells of battery.

In order to insure that both ends will operate alike it is advisable to provide instruments of identical resistance at each station.

Your trouble is, very likely, due to insufficient battery.

Have you tested the pair of wires through the cable to see if they are clear?

To measure resistance accurately a Wheatstone bridge is necessary, but if you have a milliammeter or a galvanometer available you can compare a known resistance with an unknown resistance.

Connect one dry cell in series with the meter and your 150-ohm relay and note the deflection in degrees of the meter needle. Then you should wind as much of the 36 insulated wire on the cores of the second relay or sounder as is necessary to give the same meter deflection when that instrument is likewise connected. An ordinary battery ampere meter or voltmeter will not answer the purpose of this test.

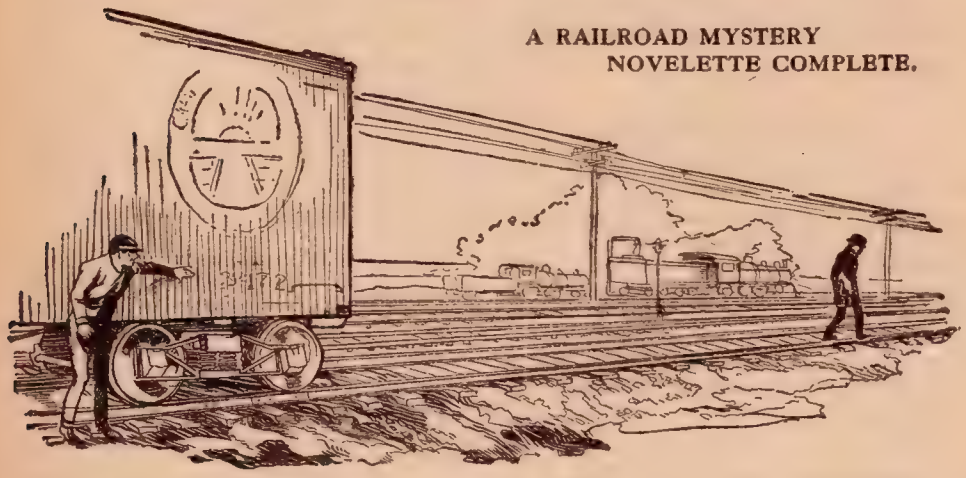
A length of two hundred and fifty feet of No. 36 copper wire has a resistance of approximately 103 ohms.

BLOW FOR BLOW.

BY CHARLES WESLEY SANDERS,

Author of "Mr. Tom Hill Assists," "On the Wings of a Warning," "Barehanded McLaren," "The Shadow of Disaster," "Sleuth 'Morse' Plugs a Circuit," etc.

A RAILROAD MYSTERY NOVELETTE COMPLETE.



CHAPTER I.

THE THREAT.

DAN BRADLEY had been summoned to appear before the new superintendent. Dan Bradley obeyed the summons jauntily. He was not afraid of the new superintendent any more than he had been afraid of the old superintendent, now gone to his long reward.

Bradley did not know whether he was to be on the carpet to the superintendent, or whether he was to receive recognition for services more brilliant than faithful. For Bradley was one of those railroaders who made good by daring. He was not a patient man, and he liked to take chances.

Under the old régime he had laid off a good deal, but Hartley, the superintendent now dead, had overlooked that. Hartley had been an old-timer, and if a man delivered the goods he was likely to overlook occasional lapses.

When he had been forced to call Bradley on the carpet, he had been gentle in his treatment of that engineer. He took a fatherly air with Bradley, and Bradley had always smiled when he had been called in.

Signing orders on the pay-car and laying out fast trains had been Bradley's chief offenses in the past. But the pay-car matter had been adjusted long ago, for there had been a year during which Bradley had not taken a drink and durwhich he had saved considerable money.

Of late he had grown more cautious, too. He had taken no chances of trouble by fleeing into Dillon with a heavy load of stone before fast trains. Formerly he had been able so to flee, because he had had an acquiescent conductor; but now he was almost always in to clear, resting serenely on his box while the fast trains whistled by.

Bradley was not sure but that on this morning the new superintendent was going to give him a regular passenger run. He had been running extra passenger for three years.

He had not heard of a passenger engineer quitting but that might have taken place. Old Thompson, too, might have retired on his pension. It was about time, Bradley figured. That would make a vacancy, and if his extra running were to be calculated Bradley was next in line.

He was not in line by seniority, but Hartley had given him to understand when he started running extra that the first regular berth would be his. Hartley had jumped him over the heads of a good many older men, and Bradley supposed he would continue to do so.

When Wightman had been jammed between his engine and the tender up in the hills and had died in the hospital, a man had been needed to run the quarry engine. It was a job nobody wanted. They all begged off with the lenient old man. He sent for Bradley.

"Sure, I'll take it," Bradley said. "I'll run a wheelbarrow if you say so."

The superintendent had liked that kind of spirit. He kept Bradley in his mind. Next summer, when special trains with excursionists aboard were being run to resorts along the road, Bradley found himself ahead of a string of varnished cars.

Every Sunday all summer he held that job. Half a dozen times he had been called for a special passenger run. The old man seemed intent on rewarding him for his soldierly obedience in the matter of the quarry engine.

Some of the older engineers took the situation philosophically. Younger ones did not. There was Dodge, for instance. He had not been in line for the extra passenger work, being just ahead of Bradley. But he had been sore at Bradley.

The two men had got to a point where they did not speak. It would have taken little to provoke them to blows. Every time Bradley encountered Dodge he threw up his red head and glared, and Dodge glared back.

They came to call him, after a while, the old man's pet. That made Bradley furious. He wore a defiant air, and he believed himself cold. He thought he was as hard as nails in his emotions.

He told some of the men that they had been afraid of the quarry run because the work was dangerous. They had all known how Wightman had died, and they hadn't had the nerve to face a similar fate. *He* had had the nerve, and the old man had recognized it.

This was the situation when he answered the summons from Eldridge. At the foot of the stairs leading to the division offices he encountered Wray, the trainmaster. Bradley saluted, and Wray nodded and passed on.

Bradley didn't blame Wray for being short in his greeting. He knew about how Wray felt. The trainmaster had believed himself in line for the superintendency.

He *was* in line for it, Bradley knew. He had served the road for thirty years. He had been operator, despatcher, chief despatcher, trainmaster. He knew his business. He was no pencil-pusher.

But the powers had seen fit to bring a younger man from another road. No wonder Wray was sour.

Bradley passed on up the stairs and entered the operating-room. Operators, copiers, and despatchers, working all together in the big room, looked up to nod and smile at him. They all liked him because of his unfailing cheerfulness and because of his competence.

"He knows his business, even if he doesn't look after it," the chief had said once in Bradley's earliest, most reckless days.

Bradley went into the chief's room now. The chief, a grizzled veteran, looked up from his work. There was no shadow on his old face because of the fact that the holding back of Wray had held him back. If Wray had been promoted, he would have had Wray's place.

But since it would not be many years before he would slip out of the harness entirely, he did not care.

"Hello, Dan!" he said. "What's the matter with you now?"

"Not a thing that I know of," Bradley answered. "The super has sent for me. Know what he wants?"

The chief shrugged his shoulders expressively.

"Is he a rip-snorter, dad?" Bradley asked.

"You better keep a stiff upper lip," the chief said. "And if it's time for you to see him, you'd better go along in. He's not a patient man."

Bradley's red head went up. The old chief chuckled.

"I haven't been doing anything," Bradley said. "He hasn't got anything on me."

"You better go in," the chief repeated.

The door of the superintendent's room was at Bradley's hand. He turned the knob and walked in, closing the door behind him. The superintendent went on with his reading of morning reports.

Bradley had a chance to look him over. He saw a tall young man with smooth black hair over a pale face. Two points Bradley noticed first: The superintendent was dressed like a dude, and he wore nose-glasses.

"Pencil-pusher," said Bradley.

Just then the superintendent looked up.

"Bradley?" he asked.

"Yes," said Bradley. "You wanted to see me, Mr. Eldridge?"

"Sit down," Eldridge ordered.

He dropped his eyes to his work again, and Bradley sat down. He was feeling a little uncomfortable. This was not much like the old days.

Bradley, though he was guilty of nothing, missed old Hartley's gentleness. The new super certainly had a hard blue eye. Bradley guessed he would never be particularly popular with the boys.

Bradley sat and twiddled his thumbs for five minutes. In the despatcher's room outside the sounders clattered on. A switch-engine went snorting past the building, shaking its old timbers. There was a dash of snow against the windows. Bradley wondered if the first storm of the winter was about to begin.

Then abruptly Eldridge shoved his papers back on the desk and turned in his chair. He took off his nose-glasses and fixed Bradley with his cold eyes.

"Bradley," he said, "how does it happen that you've been running extra passenger?"

"Hartley started me," Bradley answered.

"Why did he promote you over the heads of half a dozen other men?"

"He wanted a man to take the quarry run. It's a mean job. Nobody wanted it. I took it."

"And Hartley rewarded you by giving you extra-passenger work?" Eldridge asked.

"He gave me the work," Bradley said. "He didn't say anything about reward."

"It has seemed to me since I have been here that a good deal of coddling has been going on on this railroad," Eldridge said.

Bradley's red blood went up across his face to meet his red hair. Eldridge's statement was like the insinuation of the men that he was Hartley's pet.

"I never asked anybody to coddle me!" he flared out.

Eldridge laughed mirthlessly.

"I'm glad to hear you say so," he said. "I'm glad to hear you say so, because I'm putting you back to your proper place in the list."

Bradley's face was blank under Eldridge's keen scrutiny. This setback meant more to him than anybody would have suspected.

For Dan Bradley, the emotionless, the hard, had been a target for the barbed shaft of love. That was why he was saving his money; that was why he was no longer reckless.

He had hoped that before long he would get a regular passenger run. The

girl he was engaged to had borne a heavy burden for quite a while, and that burden would naturally be shifted to Bradley's shoulders when they married. He wanted to have a good job then, so that his girl should have everything she had not had before. Reckless men, grown cautious, are likely to be more so than men born cautious.

"I am fixing up the list so that every man will have what is coming to him," Eldridge went on. "I find that makes you seventh."

Bradley pulled himself together.

"Is there something in my record that's against me?" he asked.

"Oh, no!" said Eldridge. "I understand you're a good runner, and that recently you've quieted down. Mr. Wray says you're one of our best men now. I hope you'll keep on being so. You'll get a passenger run in your turn."

"I guess that 'll be some time," Bradley said dully, as he rose.

"I can't tell about that, of course," Eldridge said. "Good morning."

Bradley stood a moment. Even Dodge was ahead of him on the list now. That rankled. He supposed that it was only fair that he should step aside for the older men, but even now he had a foretaste of Dodge's triumph over him. He might have to lick Dodge.

"Well," he said angrily, "I'll take my place running through freight then. I'd rather be hitting the high speed than shunting stone-cars if I'm not to get anything out of it."

"I am not prepared to make a change in the quarry crew," Eldridge said. "For the present you will remain where you are."

Involuntarily Bradley's hands closed tightly. He took a step forward. There was a momentary mist before his eyes.

The mist cleared just as Eldridge looked up. The blue eyes, back of the resumed glasses, were colder than ever now.

"That's all, Bradley," Eldridge said shortly.

Bradley felt his muscles grow soft. There was nothing he could do but quit, and in the circumstances he could not quit. He had worked too long and too hard to climb even to the place to which Eldridge had consigned him—his proper place by seniority.

He got out of Eldridge's office and strode through the despatchers' room without looking to right or left. At the bottom of the stairs he met Wray again.

"What 'd he do to you?" Wray asked as he looked at the flushed, angry face.

"Set me back," Bradley said. "Took my passenger work away from me. Kept me on the quarry run, too. Wouldn't even give me my regular freight rights. What kind of a guy is he, Wray?"

Wray only shrugged his shoulders. A good many men seemed to be shrugging their shoulders just now.

Bradley felt his anger mounting higher, now that he had put into words what Eldridge had done to him.

"He's a pencil-pusher, Wray," Bradley ground out. "He's an office guy. Just think of him sitting in old Hartley's place and telling better men what to do! Great guns, it was all I could do to keep my hands off him up there in his office!

"I'll bet I could put him away with one punch. And I may do it if he drives me too far. I may do it."

He turned away from the trainmaster and strode off down the track, his head bent against the driving wind. Wray watched him go till he was lost to sight among the cars on the tracks.

"He may, too," said Wray.

CHAPTER II.

MORE THREATS.

WHEN Wray went up to his office, word was passed to him that Eldridge wanted to see him. As Wray was passing the telegraph table, a man sitting at the last set of instruments rose.

"Mr. Wray," he said quietly.

Wray stopped and faced the man ab-

sently. His mind did not seem to be on his business. He had a far-away look in his eyes.

"I understand Eldridge is on the war-path," the operator said in a low voice. "The chief says I'm to take a night office out on the line. I just wanted to say that it didn't matter. I can get along all right now."

"I guess you'll have to stand for it, Jim," Wray said. "I've done the best I could for you."

"I just wanted to tell you not to start anything on my account," the man said. "I know how you're feeling. And I think it's a shame. As far as railroading goes, you've got him backed off the map. *I* know that."

"Maybe he's going to can me, too," Wray said with a grim smile. "But I'm not worrying."

He passed on, and the operator resumed his seat. The operator was a big man of perhaps forty-five.

If he had been a little less carefully groomed he would have been picked for a boomer. His hair was thin and gray, and purple veins showed in his face. He looked like a man who had had some rough sledding.

He himself seemed to have tried to subdue and soften this appearance of dissipation. His cheap suit was brushed; his shoes were shined; he was carefully shaved, and his linen was spotless.

But his eyes saved him more than this seeming of gentility. They were big, dark eyes, with a look of sadness in their depths. They were eyes which could have belonged to no one but a man with the heart of a child.

In spite of his age and what he had undoubtedly done to himself in the past, he showed himself to be an efficient operator. His sending was sure and easy; and when he presently shoved the resonator about and began to take a message on his "mill," he did not display the absorbed attention which an inefficient man would have shown. He had time to glance about the office, and his thoughts seemed to be anywhere but on the message he was receiving.

Wray went into Eldridge's office. Eldridge appeared to want to talk to him more than he had wanted to talk to Bradley. He swung about in his chair as Wray entered.

"Who's this man Corlett working the No. 4 wire out there?" he asked sharply.

"He's an old-timer," Wray said. "I used to know him years ago. He worked on this road for a while when we were kids together."

"I understand he was a booze-fighter, and was dismissed in the West for getting them together," Eldridge said.

"That's true," Wray said.

"What's he doing working for us, then?" Eldridge demanded. "Haven't we some live young fellow that could hold that job? It's one of the best in the department."

"Yes, we have men."

"Well, we seem to have been adopting a happy-go-lucky way of promoting men," Eldridge went on. "I want a bidding system put into effect at once. That's the only system. I'm surprised the men haven't demanded its adoption long ago."

"There was some talk of it a while back," Wray said.

"It makes for efficiency," Eldridge went on. "Have the chief put it into effect in the telegraph department at once. Have him receive bids for this man Corlett's job."

"Very well," said Wray. "What's to happen to Corlett? He's a very good operator."

"I told the chief to send him out on the road," Eldridge returned. "But I don't believe we want him at all. Let him go. This road needs some young blood."

The superintendent acted as if the interview were closed, but Wray sat on. Eldridge glance at him, but found Wray looking past him. Wray began to speak slowly.

"Corlett, as you say, was a booze-fighter," he said. "He went the pace

pretty hard. We fired him here a long time ago. He went West, and worked all over that country.

"He got married. He was unlucky in that. I suppose he was to blame as much as his wife. They drifted apart.

"Wray's climbing up to fifty now, and so is his wife. They were reunited a year ago, and he came here and asked me for a job so that he could take care of her. It takes about all he makes.

"I guess she hasn't long to live. He's sticking by her in her last days. It's quite a man's part he's playing, for I suppose he would like to take a drink now as well as he ever did.

"And we never had a better man on that wire. I'd like to have him stay on."

"Nothing doing," Eldridge said sharply. "Let him go. He has no right to stand in the way of the advancement of our younger men."

"Very well," Wray said, and he rose.

"I'm going to take a trip over the division to-night and to-morrow," Eldridge pursued. "Meet me at the station at seven o'clock, please. I want you to go with me. I want to get the details of the division's work at my fingers' ends. I plan a number of things. I think I'll keep you busy, Mr. Wray."

"Very well," Wray said again.

He went back to his own office and sent for Corlett. Corlett took his news as if it had been a blow in the face.

"Fired?" he whispered. "Why, the chief said I could have a shanty some place. Isn't there some O. S. job I can have?"

"I'm afraid not," Wray answered. "I'm sorry, old man. I know the fight you've made."

"But I've got to have a job of some kind," Corlett protested. "You know how I need the money. I was just about breaking even. I figured if I cut down on something, somehow, I could get by on an O. S. job. But to lose my job altogether—"

He paused and Wray saw that sweat had started on his broad face.

"I'm sorry," Wray said. "I have a little money, Jim. I can stake you for a while. Maybe you can hook up with the Western Union. I'll give you a note to the chief over there."

"All right," Corlett said in a low voice. He started for the door and then turned back. His face was dark and contorted with passion.

"I've a notion to chuck the whole business," he declared. "This is what a man gets for trying. For two cents I'd go in there and knock Eldridge's head off. He's no railroad man."

"You mustn't talk that way," Wray said quietly. "It won't get you anything."

Corlett passed out of the room and closed the door. He walked to his instruments like a man in a trance. The hand that opened his key shook. He cursed Eldridge under his breath.

He worked dully through the day, and that night he was waiting at the foot of the stairs when Eldridge came down. He stepped up to the young superintendent.

"May I speak to you a moment, Mr. Eldridge?" he asked.

Eldridge had cultivated a manner of abruptness. He whirled on the former boomer.

"I'll give you just about that long," he said. "What do you want?"

"I want to speak to you about my job," Corlett said. "Mr. Wray discharged me to-day. Isn't there some little shanty I could have? I—"

"What's your record?" Eldridge asked.

"It's been good since I've been here," Eldridge said. "I—"

"Before that. In the West."

Corlett's head went up. A flush added to the mottled appearance of his face.

"What does it matter?" he demanded. "I've made good here. There isn't a better man on the road so far as telegraphing in concerned."

"But I want young men in the despatchers' room," Eldridge said. "I want men that have the making of despatchers in them."

"I've run trains," Corlett argued. "I can do it again."

"Well, I don't need you," said Eldridge, to whom the argument was growing tiresome. "There isn't anything more to say."

He pulled up the collar of his coat and was about to turn away. Corlett laid a hand on his arm. Eldridge, with swift anger, shook it off.

"None of that, my friend," he said in a low, tense voice. "Do you want to land in jail?"

Corlett's hand closed. He half lifted it.

"I've got a notion to paste you in the mouth for this," he said. "I've licked better men than you before now. You call yourself a railroad man. Why, I know more about the game than you will ever know."

"Oh, very likely," Eldridge said with a short, ugly laugh, and he turned definitely away and started down the railroad track.

Corlett stood looking after him till he was lost in the deep gloom of the early winter night. Then he stepped out on the track and set off toward home.

An hour before this Dan Bradley had brought his quarry-train into the yards. He had tried to lay off for the day, but business was heavy and he had been dead-headed over to the quarry to relieve the man who had taken his engine there in the morning.

Bradley was feeling sour and morose. Eldridge's treatment of him had rankled all day. His mental condition had made him tire easily physically.

When he had turned in his engine he walked down the track to the coal-dock telegraph office. An engine was standing at the dock taking coal.

He glanced up and saw Dodge's fireman sitting on the right-hand box. He supposed Dodge was in the shanty getting his orders, and he quickened his pace.

As he came abreast of the window he saw that Miss Elliott was reading an order to Dodge and Dodge's conductor. He saw, too, that Dodge was not following the reading on his own flimsy. His eyes were on Miss Elliott's face.

Bradley entered the office. Miss Elliott was just finishing. She glanced up and her eyes met Bradley's briefly. She looked at him in a way in which she had never looked at another man. Bradley's pulses quickened and then they lagged as he remembered the news he had for her.

Dodge turned away from the window, tucking his flimsy into his pocket. He was a big man, broad and thick, and with a muscular development greater than Bradley's.

His face was molded on rough lines, and big, bright-blue eyes shone in it. For a moment he and Bradley glared at each other; then Dodge turned to his conductor.

"Heard the news?" he asked. "Some of these guys that have been hauling the varnished cars won't be hauling them any more. They're going to let the good men do that."

"If you mean me," Bradley flared out, "I can only say that I have hauled 'em in my time, and that's more than a lot of four-flushers will ever do."

Dodge still looked at the conductor, now with incredulity.

"Did you speak?" he asked. "Or what was that noise I heard?"

Bradley pushed up to him.

"Let me tell you something," he broke out. "Any time you want trouble with me you can get it. I'm not afraid of you. It's true the new super has set me back, but that's none of your business. I came within an ace of punching his face to-day. I may do it yet. And I'll punch yours right now if you give me any more of your lip."

"Aw, you!" said Dodge; but he retreated before the cold menace in Bradley's eyes and left the office followed by the conductor.

Bradley went into the other room.

"It's true, Annie," he said. "The new super has set me back. I don't know when I'll get that passenger run for keeps now."

"Never mind," the girl said, and the light in her dark eyes deepened. "It will all come right."

She came close to him and looked up into his eyes.

"Only try to control your temper. You might hurt somebody some time."

"I will, honestly I will," he promised. "But that man Dodge drives me crazy. I just dropped in to see how you were. I'll be over about eleven to take you home. How's the little mother getting along?"

"She's just about the same," Annie answered sadly. "She won't ever be any better."

"We'll take good care of her while she is here, anyhow," Bradley said; and there was a look in his eyes for her that would have startled any man who knew him.

After a while he left the office and started homeward up the tracks. Except for the switch-lights, it was dark along that way. The storm which had been hovering over the earth all afternoon showed signs of breaking, too. The wind was moaning through the telegraph wires and there were fine, hard pellets of snow in the air.

Bradley bent his head and trudged along. He was calmer than he had been all day. That was one thing about Annie Elliott: She could calm him, no matter how ruffled he had been.

She was certainly a little brick, he told himself. For her sake he was sorrier than ever about the varnished cars.

But they'd get along. You bet they'd get along. Annie was brave.

Musing, he passed a street crossing and plodded along a stretch of track. Before him suddenly an overhead bridge loomed. At the side of this there was a factory. Several cars stood on the house track.

The building, the cars, and the overhead bridge put the track in dense shadow.

Suddenly Bradley's foot struck something yielding. He almost tripped over it. He stood back a moment and then he bent over. He put down a hand and felt a man's clothing. His first thought was that a train had struck some one. He felt along the body till he found the face. That was quite cold.

He was not of a nervous temperament and he felt no fear now. Unbuttoning his overcoat, he drew matches from an inside pocket. His hands had told him that the man was lying on his back, his face upturned to the sky. Bradley lit a match and the light flared out between his hollowed hands.

On his knees he put his hands close to the man's face and then drew one hand away. For an instant the light flickered upon the face; then it died.

It was a full moment longer before Bradley was able to get to his feet. Then he found his knees were shaking. For a space he stared dumbly up and down the track. Then he broke out:

"My Heaven; it's Eldridge, and he's dead."

CHAPTER III.

WHY DODGE GOT PUNCHED.

STANDING there, with the growing storm whirling about him, he had a moment during which his brain seemed to have stopped working. Then dully he began to wonder what had happened to Eldridge.

Had he fallen from a train? That was impossible. Even if he had been riding a freight train, he would have been in the caboose or on the engine, and his absence would have been noticed?

Had he been murdered?

That thought roused Bradley from his stupor. If Eldridge had been murdered, he must get busy. Whoever had attacked Eldridge must be hunted down. He must get word to Wray, so that the trainmaster might notify the company's detective bureau.

But first he must remove Eldridge from the track. He bent over and lifted the smaller man in his arms and carried him to the fence which ran alongside the

right-of-way. There he put him gently down.

It struck him then that, since he had found the body, he would doubtless be closely questioned. He searched through Eldridge's pockets swiftly and found that his wallet, his fountain pen, and some papers had not been touched.

"It wasn't robbery, anyhow," he told himself.

He hated to leave the body out there in the cold. He lifted his head to ascertain if a train were drawing near. But there was no sound of an engine on the night air.

"I better get back to the dock office," he said, and he started down the railroad track.

Who had murdered Eldridge? The question kept turning itself over and over in his brain as he trudged along? Who had any reason to murder the new superintendent?

Of course Eldridge was offensive. He doubtless had made enemies other than Bradley himself. At that thought the engineer stopped in his long stride. What would people say about that?

Would they suspect that he and Eldridge had met in the dark and had quarreled? If they did, might the murder be laid at his own door?

He succeeded in putting the thought away. It was too grotesque. Anybody that knew him would know that he was incapable of murder. He had been rough and he had been wild, but he had never been a criminal.

He went on again while the storm increased about him. Even in the whirl of his thoughts he remembered that he would soon be through with the quarry run for the winter.

Quarrying had ceased some time since, and most of the stone had been hauled away. He wondered if Eldridge would let him run through freight then. But, no, Eldridge would have nothing to say about it. He lay back there dead. He would set back no more men.

Would Wray get the job now? Bradley took off his cap and wiped the sweat from his forehead.

"I want to quit thinking," he advised himself. "I'll be going nutty presently if I don't."

As he neared the coal-dock office he saw that Dodge's train had been backed in on the south track. He supposed Dodge had got hung up by something from the east. He was glad that he had discovered Eldridge's body in time. Whatever was coming from the east would have mutilated it.

He walked rapidly up to the shanty till he came abreast of the front window. He saw Annie sitting at her instruments, her right hand on the key.

He paused irresolutely. It was a shocking thing to have to tell a girl. He might telephone. But then he remembered how good a soldier Annie was in the performance of her duty.

He crossed to the door and opened it. Dodge and his conductor were sitting on the bench in the outer room. Dodge straightened up at sight of Bradley. His lips curled back from his teeth.

"Lay off the rough stuff for a minute," Bradley said briskly. "There's been an accident. Eldridge has been hurt."

He went into the telegraph office where the girl sat. As he had spoken she had half turned in her chair. There was concern in her face.

"Annie," said Bradley gently, "will you get the despatcher's office on the way-wire and see who's there? If Wray is there I want to talk to him. If Wray isn't there, Bagley will do."

Annie transferred her hand from the key of the train-wire to the key of the way-wire.

"Shall I break in?" she asked. "Is it important?"

"It's important," he said.

She opened the wire and said "break" and sounded the call for the despatcher's office. That office answered and she opened her key and looked inquiringly at Bradley.

The engineer was aware that Dodge

and his conductor had risen and were standing in the doorway back of him.

"Is Wray there?" Bradley asked.

Annie flashed the question over the wire.

"He's there," she said as the sounder clattered out an answer. "He's coming to the wire."

There was a pause while the key was held open in the despatcher's room. Then the sounder clicked out Wray's personal sign.

"There he is," Annie said.

Bradley put his hands on the table and leaned forward. He heard Dodge and the conductor move up to his shoulder.

"Tell Wray that Eldridge has been hurt," Bradley said. "Tell him I found him—found his body—just this side of the overhead bridge. Ask him what shall I do."

The girl sent the message with a hand that shook a little.

"Is he dead?" Dodge whispered.

Bradley nodded.

"Gee!" said Dodge, and for a moment he forgot his animosity toward Bradley.

Annie closed her key and there was a moment's pause.

"He's calling Adlard," she said. "That's Adlard answering. It's Mr. Wray himself at the key. He's stopping that No. 49 at Adlard. He's calling me now. It's a message."

She began to copy a message in her small, delicate handwriting. It was addressed to "C. and E. No. 48." That was Dodge's train. The message read:

> Go to overhead bridge and bring body of superintendent to Dillon. All westbounds are held at Adlard.

The message was signed Wray.

Dodge's conductor put it into his pocket. He turned to Dodge.

"Cut off and come out on the main, Jake," he said. "We want to hustle."

Dodge left the room and the conductor turned to Bradley.

"You better come with us, Bradley," he said, "to show us just where he is."

He, too, left the office and Bradley was alone with the girl for the moment. Her sounder was still clattering and she was lending an anxious ear to what it had to say.

"They want me to call an ambulance," she said. "You'd better go, Dan. You'd better go and get him over here as soon as you can. You're sure he's dead?"

"He's dead all right," Bradley answered.

He put a hand over her trembling ones. "You're pretty badly frightened, aren't you?" he asked.

"It's a shock," she said. "If it were not night and stormy I wouldn't mind so much. You'll come back on the engine, won't you?"

"I will, and I'll stay here till time for you to quit—till the third-trick man comes," he promised.

She went to the telephone and he went outside. The head man was closing the switch behind Dodge's engine. Bradley climbed up beside the conductor.

Dodge did not look at Bradley. Nor did Bradley look at him. If he had, he would have seen a queer look in Dodge's eyes—a look of expectancy not warranted by the definiteness of the news which Bradley had brought.

In a few minutes the engine stopped at the overhead bridge. Bradley, Dodge, and the conductor climbed down. The conductor had a lantern over his arm.

Bradley walked straight up to the place where he had left Eldridge's body. It still lay there, Eldridge's hat over his face as Bradley had left it.

"Where was he when you found him?" Dodge asked.

"Lying on his back on the track," Bradley answered.

The conductor stooped.

"Help me carry him," he said.

They bore the superintendent's body to the engine and laid it gently down in the gangway. Dodge took the lantern from the conductor and threw the light on Eldridge's upturned face.

"Somebody struck him," he said.

He turned the head slightly, and then he stood up.

"Somebody struck him a hard blow in the face. You can see his nose and lips are hurt. Then he went over backward and hit his head on a rail. I suppose his skull is fractured. That's how that happened."

Bradley nodded, his eyes on the body. Dodge did not move, and Bradley looked up in surprise.

"We'd better be getting back, hadn't we?" he said. "Wray would want us to hurry. He would want to do whatever he decently could for Eldridge."

"Eldridge probably had an argument with somebody," Dodge said.

"Yes," Bradley assented. "I looked through his pockets. Nothing was disturbed. I suppose somebody had it in for him."

"I guess he must have made an enemy or two since he's been here," Dodge said.

Even then Bradley found nothing in his tone to stir his resentment. He was too engrossed with the tragedy of Eldridge's death to seek for hidden meanings in anything Dodge might say.

Dodge fixed his eyes on Bradley's face for a moment, searching it for some sign that Bradley was disturbed; but he found none, and he climbed to his box.

He ran back slowly to the dock office, creeping over frogs so that he should not disturb the body of Eldridge, though Eldridge was far past all caring.

As they stopped at the dock office, they heard the far clang of the bell of an automobile ambulance.

"Wray told Miss Elliott to call an ambulance," Bradley explained.

"You better pull back to the road and meet it, Dodge," the conductor instructed.

The engineer pulled slowly back to the road. In a moment the light of the ambulance showed up the street. It came to a halt near the engine. A white-clad young surgeon sprang down.

"What is it?" he asked crisply.

"Got a dead man in the engine," the conductor explained laconically.

The surgeon climbed up into the cab. His examination was brief.

"He's dead, right enough," he said. "We can take him away. You'd better notify the coroner."

When the body had been taken away, the three men started back to the dock office on the engine. Bradley jumped down and ran inside. He told Annie what had happened, and she reported to Wray. As she ceased sending, she turned to Bradley.

"Mr. Wray wants you to come to his office," she said.

"All right," Bradley agreed.

The clock on the wall marked nine now. Bradley figured he would have time to report to Wray and get back to take Annie home. He was solicitous about her because of the death of Eldridge. He did not want her to go home alone in the dark and the storm.

"Yes, please be here," she said when he spoke of it. "I am nervous."

Bradley went outside. He met Dodge coming toward the office. Dodge stopped in his path. Bradley looked up. Dodge was staring at him with a grim look in his eyes and with his mouth set in cold, hard lines.

"I want to speak to you a minute," Dodge said.

"I'm in a hurry now," Bradley retorted. "What do you want?"

"Yes, I guess you're in a hurry," Dodge said. "I guess you'll be in a hurry for some time—if you make your getaway."

It was Bradley's turn to stare. He did not for the moment understand what Dodge was driving at.

"My getaway?" he repeated. "What 're you driving at?"

"What did you and Eldridge have an argument about?" Dodge asked.

"Argument?" Bradley repeated again. "Me and Eldridge? Why, man, Eldridge was dead when I found him. How could we have an argument?"

"That's what *you* say," Dodge sneered. "What was it you said, though,

before you left the office here to-night—and that was just before you met the super? You said you might punch his face.

"Well, it looks to a man up a tree as if you had punched Eldridge's face. You probably hit him when he wasn't looking for it. He went over backward and hit his head. Then you came back here with your story about finding his body. I guess maybe the police will be looking for you before long, Mr. Dan Bradley."

Bradley's ready temper asserted itself. He drew back from Dodge so that he was within easy striking distance of him. Dodge had gone just a little too far. They might as well have it out now as later.

"You—you—" Bradley stammered in his rage. "Why, I can't think of anything to call you! But you're a liar, and you know it."

"Well, you just stick around here till I can get Wray on the wire again," Dodge said. "I guess Wray will want to know what you said to me and my conductor just before you met Eldridge."

"I'm going up to Wray's office now," Bradley said. "You needn't trouble yourself."

"You'll stay here," Dodge asserted.

He put out a big hand and laid it none too gently on Bradley's arm. Bradley tried to shake off the hand, but Dodge only gripped him more firmly.

"If you don't let me go, I'll smash you, Dodge," Bradley panted. "What are you trying to put over on me?"

"You'll stay right here with me," Dodge said.

Bradley suddenly put his hands on Dodge's chest and shoved him away, wrenching himself free with a backward pull of his arm. Dodge opened his big arms to grapple with him and force him back against the shanty.

Dodge's face was a little thrust forward. In the blindness of his wrath, Bradley struck up and out at Dodge's protruding chin. The blow landed full and hard. Dodge wavered for an instant, and then as Bradley stepped back he plunged forward on his face.

Bradley, after a moment of indecision, stepped over him and started down the track again through the storm.

CHAPTER IV.

"YOU ARE THE MAN!"

HE did not at first know where he was going or what he was going to do. He wanted to be alone for a few minutes. He saw quite clearly that even if Dodge's animosity toward him had urged Dodge to make his accusation, there was apparent foundation for it.

In the presence both of Wray and of Dodge, he had made threats against Eldridge. It did not matter now that he had never meant any harm to Eldridge, that he had been merely "letting off steam." If he were arrested, and Wray and Dodge testified against him, they would forge a pretty stout chain of circumstantial evidence.

He had been unlucky in that he had found Eldridge's body. If some one else had found it, he doubtless would never have been suspected. But there was no one but himself to account for the time he had spent between his leaving the shanty and his return to it.

He kept on down the track till he came again to the overhead bridge. He searched for ten minutes for signs of a struggle, but he found none. There was a thin carpet of snow all about the scene. He looked for depressions made by scuffling feet in the gravel, but there was none of these either.

"Whoever did it gave Eldridge one swift, sharp clip, and it was all over," he told himself.

While he stood frowning down at the track, he heard an engine whistle for the bridge. A headlight showed from the west. Presently he could make out dimly the lines of an engine.

"That 'll be Dodge," he told himself. "Better not let him see me."

He ran across the right-of-way, and climbed the fence and crouched down behind a post. The engine came opposite him. He could see Dodge sitting on the box. He laughed grimly when he thought that Dodge's orders to move had come to him while he was boiling over against himself.

The long, heavy train rattled by, and soon the caboose lights passed under the bridge. Bradley climbed the fence again and came back to the track. He had a feeling of shame that he had hidden from Dodge.

Why should he hide? He hadn't done anything. And yet many men found guilty of crime had protested their innocence to the last.

Several plans ran swiftly through his mind. The one that recurred oftenest was that he should run away. He had a real terror of a jail cell. He was willing to take his knocks in the common game of life, but he shuddered when he thought of being shut away from the air.

And yet if he ran away, what would become of him? He would be an outcast, not daring to show his face among honest men.

And there was Annie.

At thought of the girl he turned back along the track. Whatever he was to do, he must see her again.

She was alone in the shanty when he got there. When he entered she rose with a cry of relief.

"I've been afraid," she said. "What happened between you and Dodge?"

He held her eyes for a moment and forced her to be calm by his own calmness.

"Annie," he said, "I may get into a mix-up over this thing. Did you hear what Dodge said? Well, he insinuated that I was the cause of Eldridge's death. I was fool enough to say to him and to Wray that I might punch Eldridge. Of course, I never meant to do that; but the words stand.

"I've been back there, and I can't find anything. The whole case will rest on circumstantial evidence. Dodge will testify against me as to what I said. Annie, do you know that Dodge is in love with you?"

"I know it," the girl said.

"That's what he's aiming at. That's what he wants to get rid of me for. And so, no matter what happens, no matter what he says, that's what you're to bear in mind. You will, won't you?"

The girl threw up her head with a proud gesture. Her dark eyes grew bright.

"I know all about you, Dan," she said, "and I know all about Dodge. He's a brute, and I think he would lie. I know what you've done for yourself in the last year. I've been proud of you. No matter what any one says, I'll do just what I promised you I'd do. But, Dan, what were you thinking of while you were up there?"

A slow flush came up under Bradley's eyes.

"I thought at first I would run away," he said.

"That's just what you mustn't do," she said. "You must stay and face whatever you have to face."

She came close to him and put a hand on his arm.

"Dan," she said, "this is the first time you've had to face any reality of life, and I want you to face it like the man you've been growing to be. You haven't done anything. I know that. No matter what they accuse you of, you must remember that. I'd rather see you go to prison for the rest of your life than to see you a fugitive."

He looked into her clear eyes, and he understood many things which he had not understood before. He understood that life had been pretty easy for him so far. He'd always made good money, and he had spent his wages on himself.

While he had counted himself a strong man, he had never faced any stern reality. This slight girl who stood before him now had borne a far heavier load than he had ever borne. What she had

earned had mostly gone for the support of her ailing mother. There had been few bright places in his life till she had come into it.

"All right, Annie," he said. "I'll face whatever there is to face. And if I get out of this, it 'll teach me to put a bridle on my tongue."

She started to speak, but her call on the way-wire interrupted her. She snapped open the key and answered the call.

"Mr. Wray wants to know why you don't come to the office," she said, holding the key open when she had listened to the sounder for a moment.

"Tell him I'll be right up there," he said.

She sped the message over the wire, and then she turned to him with longing eyes.

"Danny," she said, "don't think I doubt you. But you know you just struck Dodge out there. You didn't—you didn't, in a moment of anger, strike Mr. Eldridge like that, did you?"

He took her hands and drew her up to him so that her hands rested on his breast. He looked straight into her eyes.

"Annie," he said, "what I've reported to Wray and what I've said here are the truth. Eldridge was past all help when I got to him. You believe me?"

She gazed deep into his eyes for a moment longer, and then with a quick, backward glance she held her lips up to his. He kissed her gently.

"I believe you," she said. "Now go to see Mr. Wray."

He left her, and she saw him turn up the track toward the division offices. He found Wray waiting for him patiently.

"I just wanted to get the details of this affair at first hand," Wray said. "You know, Eldridge was pretty well fixed, and I suppose his people will have a bunch of detectives down here before long. The company, too, will make an investigation."

That was like Wray, Bradley said to himself. He took things in a matter-of-fact way. He was too seasoned a veteran to get excited.

Bradley told his story in detail. Wray sat across from him, his eyes on the engineer's face. From time to time he nodded slowly.

"Well, it looks as if somebody had had it in for Eldridge," he said when Bradley had finished.

"There's something more I want to tell you," Bradley said. "I met Dodge a while back outside of the dock office, and he as much as accused me of killing Eldridge myself."

"That's nonsense," Wray said. "You're hot-headed, Dan, but you don't go about killing people. You didn't have any fuss with Eldridge after you saw him here in the office, did you?"

"I didn't see him again till I saw him dead," Bradley answered.

"Of course not," Wray said.

He sat drumming on his desk with his long fingers for a moment. Then he suddenly shot a glance at the engineer.

"While you were talking to Eldridge this afternoon, did he say anything to you about firing Corlett?" he asked.

"The operator out in the despatchers' room?" Bradley asked. Wray nodded.

"No. He didn't say anything about anybody except me," Bradley answered.

"I've sent word to Corlett that I wanted to see him," Wray said. "I—Corlett has hoed a pretty stiff row, even if he did lay out the row for himself, Dan. I thought perhaps Eldridge had mentioned that he had ordered Corlett canned. I told Corlett this afternoon.

"I'm sending for him to reinstate him to-night. I'm in charge till they appoint a man to take Eldridge's place. I mention it because I didn't want you to say anything if Eldridge had spoken of dismissing Corlett. I wouldn't want to seem to be in the position of rescinding an order Eldridge had issued. Maybe Corlett will stand a better chance with a new superintendent."

"I won't say anything about it," Bradley said.

He sat for a moment, twirling his cap between his gloved fingers.

"Do you think there is any chance of my being arrested?" he asked suddenly.

"You?" Wray said sharply. "Why should they arrest you?"

"They might if Dodge's suspicion became general."

The trainmaster sat staring across at the engineer for a full minute; then he seemed to gather himself together.

"That's something we've got to be prepared for, Dan," he said quietly. "I don't believe you killed Eldridge, of course, but you can't tell what suspicion will do. If you get into trouble, I'll stand back of you. I've got a little money and a little property. They couldn't accuse you of murder, anyhow. If they arrest you, I'll go on your bail."

"Thanks, old man," Bradley said, and he rose to go.

As he reached out his hand to take hold of the door-knob it was turned from the other side. Bradley stepped back. The door was opened and Corlett entered. He nodded to Bradley, but his eyes went swiftly to Wray's face.

"You wanted to see me?" he asked.

"You've heard about Eldridge, have you?" said Wray.

"He's dead, isn't he?"

His tone made both men stare at him. They found his face ashen. His lips were twitching and his irises had almost disappeared.

"Sit down, Corlett," said Wray with a touch of sternness in his voice.

Corlett sank into a chair. Bradley made a move as if to go. Corlett turned quickly in his chair.

"You stay here a minute," he said. "There's something I want to say to you."

There was all the effect of a command in his voice. Before to-night Bradley would have resented his tone, but he had learned a good deal in the last few hours.

"What is it you want to say, Corlett?" Wray asked.

"What was it you sent for me for?" Corlett asked. "Let's get that over with first."

"I merely wanted to tell you that you can come to work on your old job in the morning," Wray answered. "Now, what is it? You seem excited. Losing your job didn't start you on the route again, did it?"

"Oh, no. No, no. Nothing like that. I'm all right that way. It was something about the killing of Mr. Eldridge that I wanted to tell you."

"Well?" Wray said, leaning back in his chair.

"I saw Mr. Eldridge killed," the former boomer asserted.

Bradley bent to him, his eyes grown suddenly glad. Wray's grasp on the arms of his chair tightened till his knuckles showed white.

"Did you see who killed him?" Bradley asked.

"Let me tell you about it," Corlett said.

He looked once at Wray and then his eyes sought the floor.

"As soon as I left the office I went home. The doctor had been to see my wife, and I had to get some medicine for her. I started down the track. As I passed under the overhead bridge I saw two men standing on the track talking. They seemed to be excited. I stopped. I don't know, why, but I stopped. All of a sudden one of the men struck the other and ran away."

He paused to wet his lips and wipe his forehead.

"When I talked to Eldridge this afternoon he raked up my past," he went on. "I knew it wouldn't do for me to be mixed up in a scrape like that. I went back home. A little later I came down-town by another way and I learned Mr. Eldridge was dead—had been murdered down there by the overhead bridge.

"I'm telling this so that I can get in on the ground floor. Mr. Eldridge was brutal to me to-day, but I bore him no ill-will. But I was afraid people might

suspect me if they knew I was down there and saw that blow struck."

There was silence in the office for quite a while. Bradley felt that the pause which Corlett had come to and which he held was pregnant with meaning. Wray did not stir in his chair. He still held to the arms of it with his big hands. His eyes were on Corlett's face.

"Well," said Bradley at last, "did you recognize the man who struck Eldridge?"

Corlett lifted his eyes slowly. Still he did not look at Wray.

"Yes," he said in a low voice. "I recognized the man."

"Who was it?" Bradley demanded.

"It was you," Corlett whispered. "You're the man."

CHAPTER V.

PASSING THE BUCK.

WRAY sprang to his feet and Bradley took a step toward the former boomer. Bradley choked on his anger, but Wray found quick words.

"Corlett," he said, "what 're you talking about? You must be crazy. Are you sure you haven't been drinking?"

"I'm not crazy and I haven't been drinking," Corlett answered sullenly. "I told you that no matter what happened to me I was off the stuff. This is the man that struck Eldridge and ran away."

"It was too dark for you to be sure," Wray argued.

"It wasn't too dark," Corlett argued back. "Where the two men stood was only a little ways from the bridge. I could see Bradley's face. I knew him by the way he held himself anyhow. He's got a kind of a swing to him. It's always noticeable.

"I noticed it the first time I saw him. I said to myself that he was a free-and-easy sort of man. I remembered thinking if he didn't look out he'd ride to a fall. His kind usually does. I used to have that devil-may-care-but-I-don't feeling myself."

"Oh, you've got Bradley sized up wrong," Wray said. "He used to be rather rash, but of late he has tamed down. There isn't a quieter man on the road now. He doesn't go about with a chip on his shoulder."

"Well, he was sore at Eldridge," Corlett said stubbornly. "You could see it sticking out all over him when he left the office. He was fighting mad. The way I figured it, he met up with Eldridge while Eldridge was on his way to the yard.

"Bradley goes down the track to his boarding-house every night. I've seen him. He lives up beyond me. Wouldn't it be natural for him to stop Eldridge for argument if they happened to meet—especially when Bradley was just in from the quarry run and feeling kind of grumpy?"

"There isn't any mystery about why Eldridge was on the track," Wray said. "As you figure, he was on his way to the yard-office. I had an engagement to meet him at the station. We were going out over the division. But you mustn't accuse Bradley with no more proof than you have, Corlett."

Corlett raised his dull eyes to his old friend's face.

"I'd be the last man in the world to accuse another man unjustly, wouldn't I?" he asked. "I've been through the mill too hard for that myself. I tell you it was Bradley. I knew him then, just as well as I know him now."

Bradley had forced himself to be cool. His first impulse had been to throw himself on Corlett. But he saw that he must restrain himself in that respect from now on. He was in too deep to fight his way out physically.

But he had been watching Corlett, and he thought he had seen something evasive, something hidden, in his eyes. It occurred to him that Corlett had as much cause for grievance against Eldridge as he himself had had.

"Did you see Eldridge after you quit work to-night?" he broke in.

Corlett caught his breath. His eyes refused to meet the engineer's. Bradley believed he had struck a clue. He could have laughed.

Did this old boomer think he was going to clear his own skirts by accusing Bradley?

"Yes, I saw him," Corlett confessed at last.

"Where?"

"Down-stairs."

"You had some words with him?"

"I didn't have any words exactly. I —I—he—"

"I—he—" Bradley sneered. "What did you say to him?"

"I asked him not to fire me. I told him I had a notion to paste him in the mouth. I—I laid my hand on his arm."

"Oh, you did, did you? Well, that's a lot more than I did. Why, you cheap brass-pounder, what do you mean by accusing me—saying you saw me down there on the track—when you put Eldridge away yourself?"

Wray leaned forward again at that and his arms tightened once more on the arms of his chair. He had known Corlett for a long time. He had known him to be weak, but he had never known him to be vicious. He looked now as if he did not believe what Bradley had said.

"I tell you I didn't see Eldridge after I left him down-stairs till I saw you strike him down there by the bridge," he said, and there was a finality in his words that indicated he had said all he was going to say.

Bradley turned to Wray with a shrug of his shoulders.

"What're you going to do now?" he asked. "This boomer has spoken his piece. What do you think about it?"

"I told you, Dan, that I didn't think you killed Eldridge," Wray answered. "I don't think so now. I don't say that you wouldn't have struck Eldridge or any other man if he had insulted you, but I don't think you did strike him. If you had struck him I think you would say so now. I don't think Corlett did it, either."

"I've got this guy and Dodge lined up against me," Bradley said. "What am I going to do about that?"

"Dodge doesn't know anything," Wray returned. "And Corlett is going to keep his mouth shut. You understand that, Corlett?"

Corlett lifted his head. At last he looked Wray squarely in the eyes.

"I'll keep my mouth shut so long as nobody else is accused of having killed Eldridge," he said.

"You mean so long as you aren't accused," Bradley said.

"Me—or anybody else," Corlett declared.

Bradley turned to Wray. Wray had often seen Bradley angry. But he had never seen this look on the engineer's face. It was the look of a man coldly determined.

His eyes were calm. There was no excitement in his manner. His ready passion seemed to be silenced for the time.

"Look here, Wray," he said in a low voice, "if I find so much as a whisper against me I'm going to start something on this railroad. I don't know who killed Eldridge any more than you do. But I won't have anybody whispering behind my back.

"I'm frank to say I don't like this guy Corlett. I think he's standing from under. I've seen these rounders before. They've got about as much honor as a peanut. If he starts anything with me, he'll find out where he gets off."

"I've told him to keep his mouth shut —and he will," Wray said. "If I thought for a minute that you killed Eldridge I'd hand you over to the police. But I know that if you had you'd tell me as man to man, so that I wouldn't be working in the dark. That's all there is to that."

"Very well," Bradley said, rising. "But I'll know if there's any talk."

Before Wray could reply to that there was a rap on the door.

"Come in," Wray called out.

The door was opened and a young man stood in the doorway. At sight of him the

three men in the room had difficulty in repressing exclamations. At first glance the man looked as if he were Eldridge come to life.

But as they looked him over they saw a difference in him. Where Eldridge had been abrupt and impolite this man was suave and smiling.

He was more heavily built than Eldridge, too. The shoulders of an athlete were bulked beneath his overcoat. For the rest, he had eyes like Eldridge's, except that a smile lurked in his, and he had Eldridge's hair and nose and mouth.

"I was looking for Mr. Wray," he said pleasantly.

"I'm Wray," the trainmaster said. "Will you come in and sit down?"

The man entered and closed the door behind him. As he sat down, his eyes traveled over Corlett and Bradley. Bradley saw there was a humorous twinkle in their depths.

The engineer supposed this was Eldridge's brother, and he looked inquiringly at Wray. It might be a distasteful task to break bad news to this smiling, easy-going young man.

"You've probably guessed that I'm a brother of Eldridge," the man said as if he confirmed Bradley's identification of him.

"You look like him," Wray said.

The young man took out a silver, gold-lined cigarette case. He sprung it open, and while he selected a cigarette with steady fingers he observed:

"I've just learned that my brother was murdered to-night."

The three men sat staring at him. He put the cigarette between his lips and lit it. He took a long inhalation and blew out the smoke slowly.

"I suppose you're surprised that I don't show grief," he said. "Well, the fact is that my brother and I didn't get along very well together. He was a good business man; I was not. I am not now. He knew how to get good jobs and keep 'em. He knew how to bank most of his salary, too.

"He must have left a pretty good-sized roll. I, by the way, am his heir." He paused to smoke a moment meditatively.

"I always told my brother somebody would put him away some dark night," he resumed. "He was a crank from the word go. He was so steeped in his notions that he had no humanity left in him. I suppose he'd have been president of a railroad some time if he had lived. Well, he didn't like anybody, and nobody liked him. There's none to mourn for him.

"I've been rather a black sheep, to his way of thinking. I've traveled and I've drunk a little and I've smoked a lot. But I never did anything especially bad. The reason I came over here was to ask him to give me a job.

"I'd come to the conclusion that it was about time for me to settle down. I couldn't stand office work. I'd stifle. I thought maybe he'd give me a job firing an engine. Or do you have to do something else before you fire an engine? I don't know.

"Any way, I'm husky, and I wanted to go to work. Anything would do for a start. You've taken my brother's place, Mr. Wray?"

His speech had been rather disconnected, but it had not that effect on his hearers. Wray saw him plainly in his own picture: He was a clever idler whom doubtless his brother had been forced to aid a good many times.

He seemed rather heartless, too. His brother's death appeared not to have affected him at all.

"I have taken your brother's place temporarily," Wray said. "I suppose there will be a new superintendent in a few days."

Young Eldridge lifted his humorous eyes to the trainmaster's face.

"I suppose I can get a job somewhere in a busy village like this," he said. "But I just came in on your No. 6 from the West, and I haven't had time to look around. Is there any chance, Mr. Wray, of my getting a job as fireman or whatever job a man has to take to become a

fireman finally? I'm willing, and strong enough to do the work."

Something in his speech which had escaped the others had caused Wray to lean forward in his chair and to grip the arms again as he had gripped them when Corlett had accused Bradley.

"You say—" he began.

Then he checked himself suddenly, for the humorous look had swiftly died out of Eldridge's face. The eyes were keen and alert now.

Wray saw that there was a steady intelligence behind them. But Wray was not to be caught stammering. He had met too many emergencies in his railroad career to be taken off his guard.

"You say you are your brother's heir," he went on smoothly. "Perhaps you won't want a job firing when you get his money."

"Oh, my brother didn't leave enough for that," Eldridge said. "He paid for his own education and later for mine out of his salary. He may have a few hundreds or thousands—not enough to keep me in idleness for the rest of my life. Besides, I've always meant to go to work seriously some time, and I think this is the time."

"See me in the morning," Wray said. "I'll fix you out."

Eldridge lit another cigarette and leaned back in his chair. He seemed, in spite of his careless attitude, to be waiting intently for what Wray should say next.

"You'd doubtless like to hear about your brother's death," Wray ventured in a moment.

"Why, yes, naturally," Eldridge said.

Wray gave him the details, omitting the suspicion which Dodge and Corlett had cast on Bradley and which Bradley in turn had cast on Corlett.

"Who was the last man to see my brother alive?" Eldridge asked sharply as Wray finished.

"Corlett here, an operator out in the other room daytimes, saw him at the foot of the stairs at supper-time," Wray answered.

"And Bradley was with him there under the overhead bridge before he was attacked," Corlett broke out.

"I told you to keep still," Wray growled.

Eldridge sat up in his chair. His lids half veiled his eyes now. Between the slits the eyes shone brilliant.

"Keeping still is no good, Wray," he said. "Let's have what this man has got to say. Let's have everything that throws any light on my brother's death. I'm his only relative, you must remember. I'm probably the only man that cares whether the mystery of his death is solved or not. Now, then."

"Tell him what you know, Bradley, and then you, Corlett," Wray directed.

The two men repeated what they had told Wray. When Corlett had finished, Bradley sat looking straight at Eldridge. His jaw had hardened.

He had recognized something stern beneath Eldridge's soft exterior. He didn't believe Eldridge had all his cards on the table.

Eldridge only got slowly to his feet. He was smiling and he hid a yawn behind his white hand.

"I don't see anything in all that," he said. "A man like Bradley or a man like Corlett isn't going to murder his superintendent because the superintendent sees fit to make changes in his working force—even if those changes affect one or both of them in their material fortunes. No, we shall have to look further."

He turned to Wray.

"I'll see you to-morrow, Mr. Wray," he said. "I'll appreciate anything you can do for me. I'm in earnest about going to work. I only wish my brother had lived to witness my change of heart. Good night, gentlemen."

He bowed himself out and closed the door.

"He's smooth and easy," Bradley said, "but he's clever. You can see how Corlett's story about me affects even him. He wouldn't believe it."

Wray was sitting then with his head

dropped to his breast. He seemed to be in a brown study. After a bit, while the two other men watched him, he lifted his head.

"You heard him say he came in on No. 6, didn't you?" he asked.

They nodded.

"If he had come on No. 6 he would have got here after his brother was killed," Wray said. "If he came on No. 4 he would have got here before his brother was killed.

"I don't know why he said he came on No. 6. But he didn't. No. 6 happens to be running two hours late, and she's just about due at the station now."

CHAPTER VI.

PUZZLES, QUESTIONS—AND LIES.

"ELDRIDGE is lying, then," Bradley said.

"He is lying about the train he came on," Wray said. "Why he is lying, I don't know. And I think his application for a job is phony. For some reason or other, he wants to get a connection with the road his brother worked for. And he isn't the careless, happy-go-lucky fellow he'd have you believe. He kept to that pretty well, but the real stuff back of it showed through now and then."

"Perhaps he was wrong about the number of the train he was on," Bradley ventured.

"But he said he had just got in," Wray objected.

"That's true, too," Bradley assented.

They pondered that for a while, and then Wray suddenly turned to his desk telephone.

"I know the clerk that's on duty now at the hotel," he said. "I'll call him up."

He talked to the clerk for a few minutes, asking guarded questions about Eldridge's arrival.

"He got in on No. 4," he said as he hung up the receiver; "and he's got the best quarters the hotel affords. That doesn't look as if he were short of money. Why do you suppose he lied about his train? Why do you suppose he happened to arrive here just before his brother was killed?"

The same thought seemed to be in the minds of Bradley and Corlett as apparently was in Wray's mind. They turned it over for a while in silence. Bradley was the first to voice it.

"Maybe he killed his brother himself," he said. "He might easily have called him up when he got in, made a date, and met his brother outside the office. They might have quarreled and got into a fight. If this fellow has been a spendthrift, his brother wouldn't have any use for him. And he doesn't seem to feel very bad about losing his only relative."

"If he did do it," Wray said, "he'll be trying to put it off on somebody else. What he said about you two fellows may be only a bluff. You'd better be careful. He may have detectives on your trail by this time to-morrow."

The trainmaster got up and walked over to the window, and stood staring down into the darkness outside. His eyes brooded over the scene dully for a moment and then they lighted up. He turned back to the other men.

"Say," he said, "as a matter of protection to you fellows, we'll have to put Eldridge where we can watch him. So far as we know, you two are the only men who had any words with Eldridge before his death. One of you threatened him to his face practically, and the other boasted of what he could do to him if he tried. That's flimsy, but I don't know what a clever lawyer would do with it.

"Neither of you has an alibi. Corlett says he was in the vicinity of the crime at the time of its happening. You, Bradley, found the body. And there you are!"

"It's fierce it should happen that way," Bradley said.

The light in Wray's eyes deepened. He was closer to being excited than Bradley

had ever seen him. The engineer was conscious of a feeling of gratitude toward this veteran who without question stood by the men he knew.

"I'll tell you what we'll do," Wray said. "We'll see whether Eldridge is bluffing about going to work. I'll put him right to firing in the morning. And I'll turn him over to you, Bradley. You'll have about all the stone out of the quarry in a few days.

"You can break him in on the quarry engine, and then I'll see that he goes with you on freight. He looks husky, and if you devote as much time as you can to him, you'll be able to break him in so that he can keep up steam for you. I don't know what his game is, but he hasn't played entirely fair with us. So we have a right to take these precautions. You look out for him to-morrow. Now, you fellows better go home and go to bed, and get on the job in the morning."

He turned to Corlett and put his hand on Corlett's shoulder.

"Jim," he went on, "I want you to be cautious. I want you to keep your mouth shut about Bradley. You've made a mistake, and I know you don't want to make trouble for an innocent man. Do you hear?"

There was a commanding ring in Wray's voice. But Corlett did not seem to respond to it. He kept his eyes away from Wray's.

"All right," he said without emphasis.

He and Bradley left the office together. At the bottom of the stairs Bradley stopped. Corlett faced him. He met Bradley's gaze squarely. He seemed to have lost the timidity he had felt in Wray's presence.

"What did you kill Eldridge for?" Bradley snapped out.

"I didn't kill him," Corlett said. "You killed him yourself."

Bradley felt his hands go shut involuntarily. A choking anger surged up through him.

"You'd better go easy on that talk," he grated out.

"Yes, just like that," Corlett sneered. "You're ready to jump on me, just like you jumped on Eldridge. It's all you can do to keep from giving me the wallop. That's what got you into this thing—your temper. You can't control it."

Bradley relaxed. Again he saw that fighting was out of the question.

His hands were tied. If he struck a man now, no matter how great the provocation was, it would be an indication that he had struck Eldridge.

For a moment his valiant spirit wilted. He took a step toward Corlett.

"Say," he said, "you've got the wrong dope on this, somehow. Have I ever done anything to you? Have you got it in for me for some reason or other? What's back of all this?"

"I haven't got it in for you," Corlett said. "The fact that it was you I saw doesn't make any difference. If it was any other man, it would be just the same with me."

"You're married, aren't you?" Bradley asked.

"Yes; I'm married."

"If a man thought he had anything on you, you'd want him to keep his mouth shut, especially if you knew you were innocent, wouldn't you?"

"Yes."

"Well, I tell you I wasn't down there by the bridge when Eldridge died. I knew nothing about it till I found his body. And when you strike at me you strike at the woman who's to be my wife. Does that make any difference to you?"

Corlett stared down at the rugged face from his place on the step. A look of slow disbelief came into his eyes.

"Why, they said you were wild and hard as nails," he said. "I didn't know there was a girl—"

"It's only been lately," Bradley said. "This goes against the grain with me, fellow. If I was fixed like I was a year ago, you could go to thunder for all of me. I'd go to the mat with you on this proposition. But what can I do?"

Corlett scanned Bradley's face anew.

He wanted to see whether Bradley was lying, but Bradley showed only concern. Corlett put his hand on his shoulder as Wray had put his hand on Corlett's shoulder a few moments before.

"I didn't know about that," he said. "I'll keep my mouth shut."

"All right," Bradley said, with a quick glance at Corlett's face for confirmation of what he said. "I'll depend upon you."

And then, because he had humbled himself to ask aid for the first time of any man, he turned abruptly and strode off in the darkness. Corlett stood looking at him till he was lost to sight.

Then the old boomer stood leaning against the door-jamb for full five minutes. At the end of that time he turned with a sigh and climbed the stairs to the despatchers' room. He crossed that and entered Wray's office without knocking.

When Bradley came to a street light he looked at his watch. He remembered his promise to call for Annie. His watch marked five minutes to eleven. He had just five minutes to get to the dock office. He hurried down the track.

Presently he came to the overhead bridge. He passed under it and came out on the other side. He was about to hurry past the place where Eldridge had died when he was brought up short by sight of a man crouching beside the track. Though he could not see the man's face, he knew at once that he was Eldridge's brother.

The engineer backed slowly into the shadow of the overhead bridge. A new caution had been bred in him in the last few hours. He knew of no reason why he should not have gone on and spoken to Eldridge, but he wished to see what Eldridge was doing. He wished to observe him without being observed.

Eldridge crouched for five minutes. He seemed to be carefully scraping the snow from the gravel and to be hunting for some object. At the end of five minutes his search was interrupted by the whistle of an engine. The long glare of a headlight dispelled the darkness to the east.

Eldridge ran up the right-of-way and climbed the fence as Bradley had climbed it earlier in the evening.

Bradley crouched against the stone of the bridge. The glare of the headlight picked him out as he stood there, and he cursed himself for a fool for not having concealed himself better.

The train passed under the bridge, and the caboose lights vanished around a curve. Bradley scarcely breathed. He wondered if Eldridge had seen him. For a moment he feared Eldridge had, for Eldridge did not at once come down to the track again.

Bradley was debating flight when he did come down. Without glancing in Bradley's direction, he began his search again. This lasted now for what to Bradlay seemed a long time.

Still crouching, Eldridge moved along the track. Once he looked up, calculated the distance he had covered, and went over it again.

Then suddenly Bradley saw him come erect. He appeared to have found something. He held it close to his eyes and examined it carefully.

The watching engineer could not make out what the object was. Whatever it was, the finding of it seemed to satisfy Eldridge.

He opened his coat and put it into his vest pocket. Then he moved swiftly off down the track, away from Bradley.

When he was out of sight, the engineer ran down the track to where Eldridge had been searching. But there was no clue in the trodden snow for him. He blamed himself that he had not searched as carefully as Eldridge had done.

What Eldridge had found puzzled and worried him. He made a hasty search of his own pockets, but he found nothing missing in them. He feared that in stooping to lift the dead body, he might have dropped something.

If it was no belonging of his, what was it? Was it something Eldridge had

dropped himself? Had the murderer come back to the scene to remove any accidental evidence against himself?

The engineer bore an added weight of suspense as he walked toward the coal dock office. The new caution in him led him to stop when he was near enough to the office to look inside through the east window.

He saw that Annie was standing at the window which looked from the telegraph office into the outer room. Undoubtedly some one was standing on the other side of that window.

Bradley was puzzled anew. There was no train at the dock, so that a crew could not be getting orders.

Keeping out of the path of light from the window, he crept over to the dock. The high incline made the darkness complete. He determined to wait there for developments.

In a few minutes a man came around the corner of the shanty and made for the door. Bradley recognized him as the third-trick operator, come to relieve Annie.

The operator opened the door, and then he stepped back quickly. Another man stepped out.

As the operator entered, this man passed through the the light from the office window. It was Eldridge.

Without looking to right or left, Eldridge started up the track toward the road which led to town. In a moment he was lost to Bradley's view.

Bradley crossed the track and entered the telegraph office. Annie had just finished reading the transfer to the third-trick man. As Bradley opened the door, she looked up and gave a little exclamation of relief.

"I'm a little late," Bradley said. "Ready?"

"All ready," she answered.

She slipped into her coat and put on her hat, and they left the office together. When the darkness had taken them, Bradley put his hand confidentially on Annie's arm.

"Annie," he said, "what did Eldridge want in the office?"

"Eldridge?" the girl gasped.

"The man who just left the office was an Eldridge," Bradley explained. "He was the brother of the superintendent."

"Oh!" Annie breathed. "Why, he sent a telegram."

"What was it? Who was it to?"

The girl hesitated. Of course, if she told Bradley about the message, she would break a rule, but that was not what caused her hesitation.

She understood that since this was Eldridge's brother, his message might concern Bradley. She was merely groping for the words of the message.

"It was to a man in Chicago," she said at last. "His name was Rowland—John P. Rowland. I can't remember the address. The message merely told Rowland to come here at once—that it was important. It was signed with that man's initials only—H. C. E."

"H. C. Eldridge—sure," said Bradley.

"He was very pleasant," Annie went on. "I can hardly believe he is the brother of a man just murdered. He explained that the up-town office had closed before he decided to send the message. It does close at ten, you know."

"Yes; he decided on his message just a little bit ago," Bradley said. "Annie, he was searching around where I found Eldridge's body. He discovered something covered by the snow."

"It wasn't anything of yours, was it?" she whispered.

"No. I think not. I thought at first I might have dropped something when I stooped to pick up Eldridge's body. But I didn't. Come home, Annie. I'll tell you what I can. It isn't much."

About that same time Wray and Corlett were leaving the despatchers' office together. When Corlett had gone into Wray's room, he had found the trainmaster sitting at his desk, staring up at the ceiling. Corlett had closed the door and spoken without introduction.

"Did you notice the similarity between Bradley and Eldridge—young Eldridge?" he asked.

"Similarity?" Wray repeated. "How do you mean?"

"The similarity in their build. They might easily be mistaken for one another in the dark. They've got the same shoulders, and their overcoats are not unlike. They hold themselves and handle themselves about in the same way."

Wray sat bolt upright.

"What 're you driving at?" he demanded.

"I think now," said Corlett deliberately, "that it was Eldridge—the man who sat with us here to-night—and not Bradley that I saw strike the superintendent. Yes, I'm quite sure it was Eldridge."

"Look here, Corlett," Wray said sternly. "I want you to stop thinking about this case. You mustn't go about making these loose charges. You'll get yourself into trouble."

Corlett looked into Wray's eyes for a moment.

"I just wanted to tell you, old man," he said. "I just wanted to tell you how it was."

"I'll walk home with you," Wray said. "You must go to bed and get some sleep."

CHAPTER VII.

BRADLEY SUSPECTS AND ACTS.

THREE mornings later Bradley went around to his engine and found Eldridge already there, as he had been the two preceding mornings. Bradley climbed up into the cab.

He was surprised to find a third man standing by Eldridge as Eldridge sat on the fireman's box. He nodded to Eldridge and climbed to his own seat.

The man and Eldridge had been talking in low tones. Now the man nodded and stepped to the gangway.

"See you when you get in," he said to Eldridge.

"All right," Eldridge said, and the man sprang down.

He was on Bradley's side of the cab, and as he moved down the track Bradley had a good opportunity to observe him. He was a man of about forty, short and thickset.

From that and his heavy face, Bradley would not have expected alertness from him, but the engineer had caught the glint of his blue eyes as he had turned to Eldridge. Bradley had been aware that the eyes for the briefest space had fastened themselves upon him, and that their owner in that time had studied him as many another man would have done in a much longer scrutiny.

As the man was lost to view and the engineer put his hand on the throttle, he had a strange feeling of uneasiness. In fact, he had not been at his ease since Eldridge had been firing for him. There was something unusual about Eldridge. In the first place, he had lied about his railroad experience.

The first morning Bradley had looked over the engine in astonishment. For a green hand Eldridge seemed to know a good deal. The cab had been swept and the coal wet down. Supplies had been checked up. Everything was on hand. A deep, clear fire of soft coal was in the fire-box.

No untrained man would have handled his fire like that. And when they had pulled out on the main, Eldridge had put in a couple of shovelfuls on the bright spots.

"You seem to know a little about an engine," Bradley had said.

"Well," said Eldridge with a laugh, "I didn't tell Wray everything. What's the use? In my wanderings I have worked on a couple of railroads. But they wouldn't give me a clearance. That's all there is to that."

When Bradley had hooked her back and they were speeding down the main with their load of empty flat cars Eldridge had climbed up to his box.

"I didn't expect you on the job this

morning," Bradley had said. "I've been puzzled. There's your brother's funeral."

"The body has been sent back home," Eldridge had answered. "I'm not going." He looked out of the window and said over his shoulder: "There wasn't any love lost between me and my brother."

They had arrived at the quarry in half an hour and had begun placing the string of cars to be loaded with what was almost the last of the stone to be quarried that year. After a while they were standing on the spur.

"What sort of fellow is Wray?" Eldridge had suddenly asked.

Bradley had determined to be cautious in answering any questions which Eldridge might put to him. Since he had seen Eldridge searching in the gravel he had been suspicious of him. Either he had been searching for proof against the slayer of his brother or for something he himself had lost.

While Bradley felt moderately secure, he did not know what Eldridge might do with anything he found there. He had already seen how unsubstantial circumstantial evidence may be.

"Wray is a good fellow and a good railroad man," he had answered.

"Got a family?"

"One daughter, about twenty, I guess. Nice, pretty girl. Wife is dead."

"Daughter's pretty, is she?" Eldridge had repeated.

Bradley had looked at him. Wray's daughter was the apple of Wray's eye. He had done everything he could to educate her, had spared no expense to give her better advantages than he had enjoyed himself.

She was not only a pretty girl; she was a belle of the village. The engineer had wondered if Eldridge were a "lady-killer." He supposed he might well be. He had the looks and the manner. He thought he might speak to Wray about that.

But that feeling had been quickly lost in another. He discovered that Eldridge was watching him, studying him, when Eldridge supposed he was completely off his guard.

Once he had turned quickly to catch Eldridge's stare. There was no good-humor in Eldridge's face then. It had been hard. His eyes were brooding. He had seemed to be thinking deeply.

He was not disconcerted by Bradley's catching him. He kept his eyes on the engineer's face for a full minute before he looked away.

And now Bradley was perplexed anew by the presence of this keen-eyed man.

"Who's your friend?" he asked carelessly. "You know you ought not to have visitors on the engine."

"Oh, he's a man I met out West," Eldridge answered.

Bradley suddenly remembered the telegram Eldridge had sent from the dock office.

"What's his name?" he demanded.

A look of insolent defiance swept over Eldridge's face. He seemed quite willing to accept any challenge Bradley might issue to him. His attitude toward Bradley seemed to have crystallized into definite defiance.

"I guess it won't do any harm to have a man see me on the engine once in a while—on important business," he said.

Bradley was on his box. Eldridge had climbed to his. They were ready to pull out.

But Bradley took his hand from the throttle. He looked across at his fireman.

"His name isn't by any chance Rowland—John P. Rowland—is it?" he asked.

A swift light of resentment leaped to Eldridge's eyes. It was the first time Bradley had seen him near anger.

"How did you know about my telegram?" he asked. "What right has an operator to give out information like that? I'll see you about it when we get in."

Bradley regretted his question. He might make trouble for Annie, and just now he was in no position to help her. He had his own fight to make, for he felt

that somehow Eldridge had become antagonistic to him. But if he could learn the man's identity he might as well do so, since the question had escaped him.

"*Is* his name Rowland?" he repeated.

"Yes, it's Rowland—if that will do you any good," Eldridge returned.

"He's come here to help you clear up the mystery of your brother's death, has he?" Bradley asked.

"It isn't much of a mystery now," Eldridge said.

Bradley stared at him. His ready smile was on his lips again. He seemed to take delight in surprising the engineer.

"What do you mean by that?" Bradley asked.

"Not a thing," Eldridge answered.

Bradley saw that he would say nothing more, so he pulled out of the yards. All that day he watched Eldridge for some sign of what was in Eldridge's mind, but Eldridge had gone back to his careless attitude and Bradley learned nothing.

They pulled into the dock office that night after dusk.

"Green," said Eldridge laconically from his side of the cab.

Bradley stopped and went into the telegraph office. Annie handed him a message. It said that No. 57 was hung up beyond the quarry, and instructed Bradley to cut off his engine and go out and bring in the train.

"Dodge is on that No. 57," Annie said. "You'll be careful, won't you?"

"I'll be careful," Bradley answered.

He hesitated for a moment as if he had something to say to her, but he found no words to clothe the filmy ideas he had, and so he left her with his assurance that he would leave Dodge alone.

They found Dodge's engine with a broken blow-off cock. He had dumped his fire and drawn the water from the boiler.

There was nothing to do but tow him in, as Bradley quickly saw. He explained the situation to Eldridge.

As he backed down to the engine Bradley saw Dodge standing alongside it. He was talking to Rowland. Bradley's heart jumped with sudden apprehension. Why had Rowland singled out Dodge for an interview?

Dodge could give information only about Bradley. Were Eldridge and Rowland trying to weave a net about him? Was that the explanation of Eldridge's sudden change of attitude toward him?

As Bradley stopped his engine, Eldridge walked to the gangway. He had taken hold of the handhold before Bradley's voice stopped him:

"Where are you going?"

"I'm going to step down for a minute," Eldridge said. "I want to speak to Dodge."

He was still smiling, and the smile infuriated Bradley.

"You stay on the engine," he said. "That's your place. All you've got to do is to keep your fire going. I'll attend to the rest of this business."

"All right," Eldridge said; and he returned to his seat.

Bradley found nothing more to say. He had expected Eldridge to argue, and when Eldridge did not perplexity replaced his anger as his anger had replaced his perplexity.

While the two engines were being coupled up Bradley kept his eyes on Rowland and Dodge. They finished their talk and Dodge got into his engine.

Rowland came to the side of Bradley's cab.

"Will your engineer let me ride back with you?" he asked Eldridge.

Bradley had a sudden wish to keep Rowland close to him. He wanted to see what Eldridge and Rowland intended to do.

"Climb up," he said.

Rowland got into the cab. Eldridge left his seat, and Rowland climbed into it. Bradley shot a glance at him, but he seemed to be interested only in the coupling up of the two engines.

When he got back to the dock with the heavy train, Bradley once more found the green against him. A message told him

to put Dodge's train on a siding at the dock and bring the dead engine to the shops.

This took half an hour. All the while Rowland sat on the fireman's box, looking out of the window.

There was no word spoken while they went over to the shops. Rowland kept his position of inattention. Eldridge busied himself with his fire or stood in the gangway, staring out into the night.

He had ceased to smile. His mouth was set in a hard line. The change in him again made Bradley uneasy. Eldridge seemed to have come to some sort of decision.

They took the dead engine over to the shop and came back on the main, so that Bradley might return to the dock for his train. As Bradley stopped to let the head man throw the switch, Rowland slid down from his seat. Eldridge moved into the cab.

Bradley had the sensation a man has when he is being closed in on.

"I may as well tell you, Bradley, that I want you to go with me when you get through with your work," Rowland said.

"Where do you want me to go?" Bradley asked.

"I want you to visit the chief of police with me," Rowland answered. "There are some questions we want to ask you about the death of Eldridge's brother."

The head man had closed the switch. He was swinging Bradley ahead. Bradley caught the gleam of his lantern out of the corner of his eye.

"Do you mean you are going to arrest me?" he demanded. "Are you a detective?"

"I'm a detective fast enough," Rowland said. "You'll find me duly accredited. As to arresting you, I don't know. That will depend upon what you have to tell the police."

"This is some of Dodge's work," Bradley flared out. "You haven't got anything on me except what Dodge thinks."

"All that will come out," said Rowland coolly. "Will you go quietly?"

Bradley's brain worked fast then. He felt the injustice of this procedure.

"You're trying to frame me," he said.

"Will you go—quietly?" Rowland asked.

Bradley beat his temper down. He saw that it would only handicap him. He would have to meet Rowland's coolness with coolness of his own.

"I suppose I'll have to," he said. "I can go with you from here if you like. It's nearer to the station. I guess Eldridge can handle the engine back to the dock. He seems to understand an engine pretty well."

A sigh of what seemed to Bradley relief escaped Eldridge's lips.

"I can handle her all right," he said. "I've got a good fire laid."

Bradley stepped down from his box.

"All right, Mr. Rowland," he said. "We'll just go along. I don't suppose you'll object to my working clothes. I don't think this business will last long."

He motioned Rowland to the gangway. Rowland stepped out briskly. As he put his hand on the hand-holds Bradley was just behind him. Rowland put down one foot.

Suddenly Bradley seized him by the shoulders and exerted all his strength to shove Rowland away from him. Rowland plunged forward and fell alongside the track. In a fleeting glance Bradley saw that he was clear of the engine. Behind him Eldridge cried out. Stooping, Bradley turned.

His hand came into contact with the clinker-bar. He menaced Eldridge with it. Eldridge retreated with his hands held out to shield himself. Bradley's eyes were blazing. His face was gray in the dim light.

"Get on your box," Bradley yelled. "If you make a move I'll brain you."

Eldridge obeyed.

"I believe you would kill a man," he blurted out.

"You won't frame me," Bradley said, and he cursed Eldridge.

He climbed then to his box and put his

hand on the throttle. The engine moved out into the night just as Rowland got to his feet.

Before he could collect himself sufficiently to act, the engine was speeding down the track toward the dock.

Eldridge sat motionless on his box.

Bradley had the clinker-bar across his lap.

CHAPTER VIII.

THE FUGITIVE.

THE lights of the dock block were a half-mile away when Bradley brought his engine to a stop.

"You can take her now," he told Eldridge. "You'd better run her down to the dock and ask for orders."

Eldridge stared at him with a bewildered look on his face. To Bradley it seemed a look of real concern for him, but he would not trust it. He thought Eldridge changed too swiftly to be sincere.

"What are you going to do, Bradley?" Eldridge asked.

"I'm going to keep out of your way—yours and your friend Rowland's," Bradley returned.

"Why, you're a fool," Eldridge said. "Let me explain something to you—"

"Explain nothing," Bradley said. "Keep your mouth shut. When I get down you take the engine and do as I tell you. If you hustle, you can get up to the dock before anything is due. But you want to get a move on you."

Dragging the clinker-bar, he stepped to the gangway. There he paused a moment.

"Don't you try to follow me," he warned. "If you do, I'll lay you out. You've gone just a little too far with me. Think you can shut me up in a cell? Say, Eldridge, I think you killed your brother yourself."

The shot slipped over Eldridge's head. He still sat on the fireman's box, staring down at the engineer.

"Bradley," he said, "you're giving up everything—throwing everything away. You'll lose your job, and people will think you really are guilty. An innocent man doesn't run away."

"This innocent man runs away," Bradley jeered. "No prison cell for mine, I tell you."

"But think of your girl—"

Bradley took a step backward. His face was ferocious now.

"You keep your dirty mouth shut about her," he screamed. "How do you know anything about her? One thing more. If you try to make trouble for her about that telegram I'll kill you. You understand? I'll kill you. I'm not going far away and I'll know where to lay my hands on you. You hear?"

"I hear," Eldridge answered quietly.

Bradley suddenly threw down the bar and jumped from the gangway to the ground. He sped down the road and the darkness took him.

A moment later he heard Eldridge start the engine. The sound of it died in the distance before he had gone two blocks.

He knew the village as a man knows his own back yard, and he fled through side streets and alleys until he came to a clump of pine-trees. Out of breath, he stepped into the shadow of these to rest.

As he stood there, his anger suddenly dropped away from him. What had he done? Was he to be a fugitive now, an outcast?

Was he, innocent though he was, to be afraid to show his face among men?

He thought of Annie. What would her opinion be? In spite of her love would she think him guilty.

He leaned against a tree and cursed Rowland and Eldridge. But he saw almost at once that that was getting him nowhere.

He had work in plenty to do. He would have to fight his way out of the tangle he had got into.

He realized then that he was wearing his overalls and jumper. He would have

to have a change of clothing, and he knew no way to get one except by going to his boarding-house.

He would have to go there and get away before Eldridge spread an alarm. He acted on that at once, for he knew he had no time to debate anything.

In ten minutes he came out in the rear of the house where he lived. He judged it must be nearing ten o'clock by now, and he found that the lights in most of the houses had been put out. In his own boarding-house there was a light in the dining-room, but that did not disturb him, for the landlady usually left that burning for him when he did not come home early.

He passed around the rear of the house till he came to a side door. This was unlocked, and he opened it cautiously and stepped inside. He was in a hall from which a stairs led to the second story.

His room was at the head of the stairs. He went up rapidly, his feet making no sound on the thick carpet.

In his room he washed and changed his clothing hastily. He took what money he had on hand and a small automatic revolver. Then he was ready.

He opened the door and listened. Below-stairs a door slammed. He held his breath to listen for the sound of voices, but there was none.

He heard the heavy tread of his landlady as she passed through the lower hall to the kitchen. As the kitchen door closed he hastened down the stairs and let himself out of the side door.

He went back to the alley by way of which he had gained the house. In a few minutes he had gained the clump of pine trees again.

He was no longer alarmed for his safety. He had done this much—come this far—and he could do more and go farther.

He began to outline a plan of action. There were several persons he wanted to see, if he could see them in safety. These were Annie and Dodge and the boomer and Wray.

He placed Annie first on his list and Wray last. He was depending upon Wray. He believed the veteran would stand by him. Wray had always been true blue.

He started at once for the dock office. Back of the office there was a long dirt road, bordered on each side by fields. He came to the track after a while, went down that for a quarter of a mile, struck into a field, came out on the dirt road, crossed it, and crept through the other field to the rear of the dock office.

There were no trains in sight. The dock-tender was not in evidence.

In the rear of the shanty there was a loose, old window, battered by many storms. Bradley raised this and held it up with one hand.

"Annie," he whispered.

He heard the girl's chair scrape back and he could imagine her rising in fear.

"It's all right, Annie," he said in a low voice. "It's me. I'm here at the window. Don't make any noise."

She came into the outer room and crossed swiftly to the window.

"Why, Dan," she whispered, "what's the matter? What are you doing this for?"

"The police are after me, Annie," he said. "Don't be frightened. They're not going to get me. Rowland and Eldridge tried to arrest me. Didn't Eldridge come back here with my engine?"

"He came back," she said. "He said you were waiting for him down at the Y. Oh, Dan, what're you going to do?"

"I'm going to keep out of their way till I can get this thing straightened out," he answered.

"But to be a fugitive!" she murmured.

"Better than being a prisoner," he said. "I must be going, Annie. I had to come to you to tell you myself, so that you would understand. You'll be brave and patient, won't you?"

"I will, but it's terrible," she said.

An engine whistled from the direction of the yards. The girl bent and kissed Bradley on the lips.

"You must go," she said. "But come

back if you can. And take care of yourself."

"I will," he said.

He ran away from the shanty just as the headlight of the engine showed beyond the dock. He went straight down the track toward Corlett's house now, passing on his way beneath the overhead bridge where Eldridge had met his death.

The old boomer lived in a shabby street. There were no lights in it, and the houses were all dark. There was no sign of life. The snow on the board walk deadened the sound of his footsteps.

He knocked boldly on the door of Corlett's house. At once a light showed in a room at the end of a hall. Bradley could see that Corlett had been resting or sleeping in a chair by a table.

Corlett came down the hall, rubbing his eyes. Bradley had a momentary feeling of pity for him. He supposed Corlett was having a pretty hard time of it with his sick wife. Doubtless he was keeping many nightly vigils.

Corlett opened the door and looked out. At sight of Bradley, he stepped outside and closed the door behind him.

"What is it, Bradley?" he asked. "What has happened?"

"I want to come to an understanding with you," Bradley said. "You've started talk about me that has nearly resulted in my being arrested to-night. I'd have been arrested if I hadn't put the wallop on a couple of guys to-night. I want to know what you're going to do about it."

"Why, you haven't seen Wray since the night we were in his office, have you?" Corlett asked.

"No, I haven't," Bradley answered.

"I told Wray that it was Eldridge and not you I saw down there by the track that night," Corlett said.

Bradley exclaimed. He believed everything was clear to him now. That explained why Eldridge was trying to frame him.

Eldridge was guilty, and he was trying to cover up by accusing another man. That was why he had been searching in the gravel. He had lost something and had gone back to get it. Bradley remembered wrathfully that Eldridge had found whatever it was, too.

"You're going to stick to that story, are you?" Bradley asked.

Corlett ran a hand wearily through his graying hair. When he looked at Bradley again, his eyes were very tired.

"Yes," he said huskily; "that's the story I'm going to stick to. I told Wray I was quite sure. But now I'm positive."

"You'll swear to it?"

"I'll swear to it."

"Good for you!" Bradley said joyfully. "That makes me feel better. You'll be here or at the office when I want to find you, won't you?"

"Yes," Corlett promised.

Bradley put out his hand. His eyes were shining. The boomer took the hand, but Bradley found his clasp cold. The boomer's eyes were like the eyes of a dead man.

"Good night," he said, and he turned back into the house.

"Poor old guy," Bradley said as he went down the street.

He felt no further need of caution now. He had in his favor the only direct evidence there was. He felt armored for his fight.

He walked down the main street with his head in the air. He met no one.

At Dodge's house he ran up the steps and rang the bell. Dodge opened the door. At sight of Bradley he gaped.

"You thought I was in jail, didn't you?" Bradley asked. "I'm not. I want a word with you. You'll come out and close the door, unless you want your folks to hear what I've got to say."

Dodge complied.

"Don't talk so loud," he growled when he had closed the door. "And don't get gay. I owe you one for the punch you gave me the other night. What do you want?"

Bradley drew his right hand from his

overcoat pocket. The automatic pistol glimmered in his palm. He presented it at Dodge's breast.

"I just want to know what you and Rowland were talking about to-night," Bradley said.

Dodge glanced down at the little weapon and then at the face of the man who held it so steadily.

"We were talking about old times," Dodge said. "I used to know Rowland."

"Where?"

"Oh, in the East. Up around Syracuse and Rochester."

"What's his business?"

"Why, he's a rail. He's running a train back there now. He used to brake—"

"You liar!" Bradley whispered. "Rowland is a detective. He's from Chicago. He tried to arrest me to-night, but I got away from him. He and Eldridge, with your help, were trying to frame me. Tell the truth."

"I don't know anything about that—"

Bradley pressed the point of the gun harder against Dodge's chest. Dodge stood his ground, but his questioning eyes were on Bradley's face. He found no yielding there. He was afraid Bradley might shoot. The man had always been a hot-head.

"Well, Rowland asked me about you," he said slowly. "He wanted to know what you had said about Eldridge before Eldridge was killed. I told him."

"You told him the truth and a little more," Bradley said. "Now, let me tell you something. I want you to keep your mouth shut from now on. If you don't, you'll get into trouble. I just now talked to a man who saw Eldridge killed, and it wasn't me he saw strike Eldridge. How do you like that?"

"It makes no difference to me," Dodge declared. "I've only told what I know. If you're innocent, I hope you keep out of trouble."

"Liar again," Bradley said. "You want to get me out of the way. You think when I'm gone you can make up to Miss Elliott. You poor fool, she wouldn't look at you. You just leave her alone, or I'll put you away. Understand?"

"I'm not bothering her."

"Don't, then. Go on into the house."

Dodge opened the door and stepped inside. Bradley saw him standing back of the pane, staring outside. He knew Dodge would go to the telephone as soon as he was gone, and he ran down the steps and hastened up the street.

He had to walk more than a mile to reach Wray's house. It was in the outskirts, a rather pretentious house standing on the crest of a hill. Up there the wind whistled mournfully among the big trees that lined the roadway. As Bradley went up the graveled path, a dog howled somewhere in the rear.

The house was in total darkness, as the others had been. Bradley went up on the porch and groped for the bell he knew was at the side of the door.

He pressed the button and waited. There was no response from within. He pressed the bell again. Still no response.

Impatiently he put his finger on the button and held it there. Inside the house he could hear the bell whir.

At the end of a minute he stopped and listened. Still there was nothing but the silence of the night, broken only by the wintry wind. Bradley uttered an exclamation of impatience.

Was Wray away from home? Where was his daughter? He had to see Wray to-night. He stood staring at the door.

Then from the end of the porch came Wray's low voice:

"What do you want? What is it?"

Bradley turned. Wray was standing below him. He had apparently come out of the house by a side door. He held a gun in his hand.

"It's me—Bradley," the engineer said.

"Good Lord, Bradley!" said Wray. "What's the matter? What 're you rousting folks out of their beds at this time of night for?"

He came round the end of the porch

and mounted the steps. Bradley faced him.

"I want to tell you something, Wray," Bradley said.

At the end of his recital Wray was silent for a long time.

"Bradley," he said at last, "I want you to stay here with me for a while. I want you to keep out of sight. Eldridge mustn't know where you are. I'm sure you didn't kill Eldridge's brother. I've told you that. The next thing is to prove it.

"You mustn't place too much reliance on Corlett. He's suffering a good deal. First he accused you, and now he accuses Eldridge. I don't think his testimony amounts to anything. I doubt if he was down there by the bridge that night at all.

"I've got a new notion about the killing of Eldridge. It's something that apparently hasn't occurred to any of you fellows. But I can't go off half cocked on it.

"Come in the house with me, Bradley. You'll be safe here."

CHAPTER IX.

OUT OF THE FRYING-PAN.

BRADLEY stood at the head of the stairs in Wray's home and looked down at two persons who stood together at the foot of them. One of these was Wray's daughter; the other was Eldridge.

Bradley could scarcely believe his senses. He had not known that the man and the girl were acquainted. Somehow, Eldridge must have met her recently, for it had been but a little while since Eldridge had questioned him about Wray's family.

Bradley had been an inmate of Wray's household for two days. In that time he had not been below-stairs. His meals had been brought to him by Wray's one servant, an elderly woman who hardly looked at him.

Bradley had not met Wray's daughter. He supposed that she knew he was in the house.

Wray had spent the evening before with Bradley. He had reported that Eldridge was working, and that Wray had not seen Rowland. He had said no questions about the murder of the superintendent had been put to him.

Bradley was growing impatient of his confinement. He had had it in his mind all day to tell Wray that he would leave and face his accusers.

But Wray had not come home. All evening the house had been silent and dark below-stairs. Bradley had read for a while, and then he turned off the light in his room and sat by his window.

At eleven o'clock, five minutes before this, some one had entered the house. Thinking Wray had come home, and eager to put an end to his hiding, Bradley went to the head of the stairs.

The hall lights below had been turned on. Just then there was no one in sight. Bradley knew that if Wray had come home, he would join him presently. He stood in the dark of the landing, waiting.

Then Eldridge and the girl stepped out into the hall from a room running from it. Their profiles were toward Bradley.

Eldridge was saying something to the girl in a low tone, looking down at her from his greater height. Her face was lifted to his, and her expression gave proof of a dawning liking for Eldridge.

In a moment they shook hands, and Eldridge left. While he went down the path, the girl stood at the door, her head bent in a listening attitude.

Then she turned back into the hall. For an instant Bradley had a full view of her face. She was smiling absently.

She clicked off the hall light and began to mount the stairs. Bradley got noiselessly back to his own room and closed the door. He sat in the dark till he was sure the girl had gained her room. Then he rose and took his cap and overcoat from the closet.

He was beset with a sense of new dan-

gers to himself. Eldridge was either genuinely paying court to Miss Wray or else he had made her acquaintance for some purpose.

Possibly he knew Bradley was hiding in the house. Or he might have suspected that Wray knew where Bradley was, and sought to get the information from the daughter.

Swift on the heels of that, doubt of Wray himself came to the engineer. Perhaps Wray had not told the truth when he said he believed Bradley innocent.

Perhaps he was holding Bradley there till Rowland and Eldridge or the chief of police should come for him. Wray's statement that he had a new clue, in the light of that, seemed a lie to Bradley now.

He decided to get out of the house. Just where he should go he did not know, nor just what he should do. With his decision made, he again opened the door of his room.

He was half-way down the stairs when he heard a door opened on the floor above. The door was not at once closed.

There was no sound of any one moving along the hall. He could imagine the girl standing in the doorway, listening to his retreat.

He came to the bottom of the stairs and opened the door. Just an instant he stood holding it open, but there was no sound from above-stairs.

He passed through the door and closed it behind him. The night was very cold, but there was no snow. He started to walk rapidly down the road.

Out of his indecision grew a desire to see Annie. His watch now marked a quarter past eleven.

She would have left the shanty by now. He determined to go to her home. He kept to the byways as much as possible, and met no one. The village streets were deserted, and most of them were dark.

At Annie's home, a cottage a block from the track, he found a light burning in the dining-room. He rapped softly on the front door.

Annie opened the door. At sight of him she gasped, and she put her fingers to her lip.

"Mother is sleeping," she whispered.

She stepped outside and closed the door. Bradley saw that she was trembling. He put his arms about her and drew her up to him.

"Where have you been?" she whispered. "I've been so worried."

He told her briefly and rapidly. She drew back from him and took his face between her hands.

"Dan," she said, "you must go away. You are innocent, but you are in danger. I can't understand Mr. Wray. He always seemed so kind and good. If he believed you guilty, I would have expected him to tell you so and give you your chance. This isn't like him at all. I'm afraid for you. I worry all the time."

She began to cry softly.

"I've had so much to worry about I can't stand any more," she continued. "You must go away for a while, where they can't find you. There you will be safe from injustice.

"Oh, I know you don't want to run away, and I don't want you to. But I want you to be safe till you have something to face these men with. I'll watch for you here, and I'll let you know the minute anything turns up. Will you—for my sake?"

Flight did not appeal to him, but he saw the sound sense of it. If Wray had turned against him and was helping Eldridge and Rowland, they might be able to "get" him.

Imprisoned, he would have no chance to fight. Free, he might clear himself. Some time he would come back to make the fight.

"All right, Annie," he said. "I'll go, for your sake. I think it's best, anyhow. Good-by, little girl."

They held each other close for a moment, and Bradley felt tears on the girl's cheeks. After a while he put her from

him gently, and she went into the house. He went down to the street blindly.

The next move was to get out of town. No suburban cars ran into the village, and there was no passenger-train till morning.

Anyhow, he would not be safe on a passenger-train. If Wray had deserted him, all passenger-trains were undoubtedly being watched.

"I'll have to hop a freight," he decided.

He knew there were conductors and engineers on the road with whom he would be safe, but head men and flagmen he could not trust so far. Some of these he was hardly acquainted with. He could not tell what word Wray had passed among them.

He would have to hide himself on a train at the dock and take his chances. Even this was fraught with danger, for the rule against tramps was strict, and some of the brakemen were very industrious in ferreting them out.

He passed through the fields again, and came out a quarter of a mile from the dock. Here engines on east-bound trains cut off and went to the dock for coal and water.

Usually conductors rode from the yards to the dock on the engines. The head man, too, would go up to the dock with the engine, and the flagman would be back protecting the train. It was an ideal place to get aboard a train.

As midnight approached the cold grew more intense. The stars shone frostily. The crescent of moon had gone. Bradley kept beyond the fence which bordered the right-of-way, and tramped up and down to keep warm.

His watch marked quarter past midnight when there was a whistle from the west. A headlight showed. Bradley climbed the fence and lay down behind a pile of ties.

The engine came abreast of him and stopped just beyond him. The fireman had the firebox door open, and Bradley could see the conductor in the cab.

The head man was riding the first car. As soon as the engine stopped, he climbed down and uncoupled her. He got into the cab, and the engine crept down to the dock.

There was no one on the head end of the train. Peering back along the dark shapes of the cars, Bradley saw the flagman's lantern swinging down the track. Presently coal began to rattle down into the tender. There was no other sound.

Bradley left his hiding-place and started along the side of the train. He was looking for an empty box car, but he had little hope of finding one. Few empties were moved eastward. This proved to be a solid train of beef.

Bradley came back from the fifth car from the caboose to the middle of the train. This, he knew, was as safe a place as any. There was little choice. He climbed up between two cars and stood there. Soon he felt the jolt of the engine as it was backed up against the train. The train began to move slowly.

Bradley saw that the conductor and the engineer had probably gone to the shanty for orders, leaving the fireman to pull down slowly and pick them up. Bradley knew that the conductor, in that event, would wait to catch the caboose.

As the train went by, he would watch it for hot-boxes. The light of his lantern might flash upon Bradley as he stood between the cars.

He moved to the edge of the cars and swung around on the ladder on the far side. There he was safe from the conductor's observation.

As the train passed the shanty he caught the glimmer of a lantern, and he knew he had figured correctly. The engineer had caught the engine, and the conductor was waiting for the caboose. He thanked his luck that he had climbed around on the ladder.

The car he rode came presently to the overhead bridge, and he knew that by now the caboose had passed the shanty. He stepped back between the cars.

The heavy train gathered swift mo-

mentum. It might not stop for fifty miles. As fast freight, it would have the best of the running.

Except for one thing, Bradley felt safe: the head man might go back over the train, looking for tramps.

The train ran for twenty miles without diminishing speed. Then Bradley felt the speed slacken just perceptibly, and the brakes below him began to set. He knew they were approaching Willowvale, where there was a long passing siding.

His car passed the shanty, and the train came to a stop. Bradley ventured to peer out toward the head of the train. A headlight was showing at the east end of the passing track. A train crept in on the track. The engine passed Bradley's hiding-place, but the fireman was looking out the window straight ahead.

The train got in to clear, and the other train started. The engineer felt he had safely got by one meeting-point. If he could be as lucky once or twice more, he would soon be far enough from the village to leave the train in safety.

The train gathered speed rapidly. Bradley stood erect between the two pounding cars. He was getting tired of his position, and he was very cold. His hands and feet ached.

The train came to a long cut and thundered into it. Bradley had a little sense of dizziness as the wall of the cut was whirled darkly by him.

He looked up. Then he crouched and drew his overcoat up about his face. There was a thin shaft of light above him. The head man was coming back over the train with his lantern.

In a moment Bradley felt that the lantern was just above his head. The light failed to move on. Bradley felt that the brakeman was standing above him. Bradley feared that the other was looking down on him. But he dared not move. If the brakeman had not seen him, a movement might betray him.

There was a moment of this, and then the light passed on and Bradley was out of its rays. He looked up. The brakeman had apparently stepped across the cars and gone on back to the caboose. Bradley thanked heaven for another escape.

He stood erect again, breathing a little more freely. His luck was holding. The train seemed to have no meeting-place now. It hummed steadily forward through the night. Dark houses and outbuildings on the farms along the way whirled backward as the train sped by.

There was the clank of the wheels on frogs. A tower light. A shanty at the side of the track. A glimpse of a long road. And then there was a voice above him.

He threw up his head. Some one was lying on his stomach on one of the cars. He stretched down a hand, and the hand held a revolver. The muzzle of it menaced Bradley.

"Come up out of there!" the voice said.

Bradley looked from right to left. He meditated jumping, but the train was hitting thirty miles now. There would be peril in a leap into the dark. If he were hurt, escape would be impossible.

The man above might be only the brakeman. Bradley felt that his best chance lay in obeying the order. He might persuade the conductor to let him go.

"If you don't come straight up, I'll shoot," the voice warned him.

"I'm coming," Bradley said.

He climbed to the top of the car. As he stepped out on it the man with the gun rose to his feet.

Bradley found himself face to face with Rowland. Eldridge stood back of Rowland. Eldridge, too, had a gun.

CHAPTER X.

MORE MYSTERY.

"WILL you be good now?" Rowland asked with a grin.

"I guess I'll have to," Bradley answered. "What do you want with me?"

"I want to get even with you for kicking me out of that engine cab," Rowland said. "That was a mean trick, Bradley."

"You seem to be feeling pretty good just now, anyhow," Bradley said. "What is the next move?"

"We're going back to the caboose just as soon as we can get there," Rowland returned. "This riding on top of a box car may be all right, but I don't much fancy it. I'm going in front. Don't try to throw me off. If you do, Eldridge will plug you. He'll be right behind you."

"You're playing off your base, Eldridge," Bradley broke out. "I haven't done anything."

"So you seem to think," Eldridge returned. "We'll see about that a little later."

"How did you know where I was?" Bradley asked.

"Oh, we had a man watching Miss Elliott's house, and—"

"You dirty dog!" Bradley cried. "You'd do almost anything, wouldn't you?"

Eldridge's face darkened. He took a step toward Bradley, but then he quickly controlled himself.

"We didn't bother Miss Elliott," he said. "I don't fight women. We put a man there because we knew that if you came back that's where you'd go first. He thought you'd remain at the house longer than you did. He phoned to me and while he was away you left.

"We figured you'd try for a getaway on a freight, and we caught the first one out of the yards. We expected you'd be hidden in the caboose. The brakeman found you by accident and reported to me. He has sense, that brakeman. Come on now. I'm tired of this kind of riding. It's cold, too."

Rowland, stepping gingerly, started along the top of the train. Eldridge put himself behind Bradley and urged him along. The conductor met him at the door of the caboose.

"I don't want you to think I had anything to do with this, Dan," he said. "I had to let 'em ride. They have a pass from the G. M., good on anything. Got some kind of a pull, I guess. If I'd known you wanted to ride, I'd have busted open a car for you. It's a shame."

"Never mind, Brokaw," Bradley returned. "They haven't got anything on me."

"Certainly not," the conductor said, and he went indignantly to the cupola.

"Where do you stop next?" Eldridge called up to him.

"Brent," the conductor snapped. "Got a wait order there. We'll be ahead of the time, and I guess we'll have to stop."

"We want to get off there," Eldridge said.

"You can fall off now if you want to," the conductor said.

Eldridge only grinned. He sat across from Bradley with his hand in his pocket. Bradley knew that a gun lay in his palm. Rowland leaned against the door. He held his hand similarly. Bradley perceived that there was no chance to escape.

"What are you going to do with me?" he asked.

"Well, we're going to take you back with us," Eldridge answered. "Then we'll see."

"Am I accused of murder?" Bradley asked.

"We'll see," Eldridge repeated.

"Does Wray know that you are after me?"

"Wray?" Eldridge said. "Well, hardly. I haven't seen Wray in a couple of days."

"You got your tip from Miss Wray, did you?" Bradley sneered.

Eldridge sprang to his feet. His face was dark with anger. He stood over Bradley.

"What 're you talking about?" he demanded. "What do you know about Miss Wray and me?"

"You were up to her house last night," Bradley said boldly. "Don't you think I ever hear any village gossip?"

"Gossip," Eldridge cried. "By—"

He stopped before the oath sprang from his lips. With an effort he controlled himself.

"Well, it isn't anybody's business," he added and he sat down again.

"You can't buffalo me," Bradley sneered. "Wray and you have been working together."

"I haven't seen Wray," Eldridge said. "Keep still now. Talk doesn't get us anywhere."

Bradley did not know whether he told the truth or not. He could not decide whether he had done Wray an injustice in his thoughts.

He leaned back in his seat and was silent. The other men did not look at him again.

Light was growing in the east when they stepped down into the yards. Eldridge put himself on one side of Bradley and Rowland on the other.

They started up the track toward the nearest road.

"Where are we going — to the police station?" Bradley asked.

"Not yet," Eldridge replied. "I want to have a talk with you first."

Three abreast, they walked rapidly down the street till they came to the hotel. Eldridge urged Bradley through the lobby of this past the sleepy clerk and up the stairs to the second floor. At the head of the stairs he unlocked a door and they entered his room.

"Sit down," Eldridge ordered Bradley.

Bradley sat down, and Eldridge went to the telephone and told the roused clerk to call a messenger-boy and to give him a number. That number, Bradley knew, was Wray's. The connection was made almost instantly.

"This Wray?" Eldridge asked. "I've something important to tell you. Can you come to my room at the hotel right away? Yes, it's about my brother. Room 10. Yes. Bradley is here."

For several seconds Eldridge stood at the telephone, listening. Apparently the trainmaster, at the other end, was silent.

"Well?" Eldridge said. And then quickly, "All right."

"He says he'll be right down," he told Rowland.

There was a rap on the door and Eldridge opened it to a messenger-boy. He scribbled a note at the battered table and handed it to the boy. The boy departed.

"I've sent for that boomer operator Corlett," he explained to Bradley. "We are going to have quite a little confab—you and Wray and Corlett and Rowland and I. It 'll probably be mighty interesting to you."

"Corlett says you killed your brother yourself," Bradley said.

Eldridge gave a hard, bitter laugh. Bradley looked at him in surprise. He seemed a great deal older in this early morning light. There were circles beneath his eyes and his face had a grayish look.

"I almost wish I had," he said. "Bradley, in this world you never know what you're going up against. Isn't that the truth?"

"I suppose so," Bradley said in his astonishment.

Then when he had observed Eldridge a moment longer he added:

"You didn't kill your brother, did you?"

Eldridge did not answer. He was staring at the floor. He seemed hardly to have heard Bradley's question. There was no more talk among them till a rap came on the door again.

Rowland opened it. Corlett stood outside. Rowland motioned him inside.

"Sit down, Corlett," Eldridge said without looking at him.

Corlett sat down and fixed his eyes on Eldridge's face. His eyes, Bradley noticed, were feverish. He wondered if Corlett had worried himself a little crazy, as Wray had intimated.

The minutes dragged themselves along. There was no sound in the little room save for the gentle hissing of the steam

radiator. Bradley felt that silence was pregnant with results.

He had no idea what Eldridge was driving at. If Eldridge and Rowland thought him guilty, he could not understand why they had not taken him at once to the station and confronted him with the chief of police.

Then it suddenly occurred to him that Eldridge and Rowland had shown no authority to take him into custody.

"Have you fellows got a warrant for me?" he asked.

Eldridge started. It was the first sign of nervousness that Bradley had seen him show.

"Oh, keep still," he said petulantly. And to Rowland he added: "Maybe Wray won't come."

"You thought he would," Rowland returned. "It was your idea, you remember; not mine."

"I'm banking on him," Eldridge said.

Again there was that silence save for the hissing steam. Eldridge rose and walked to the window and pulled aside the muslin curtains. For five minutes he stood looking down into the street. At the end of that time he uttered a soft exclamation of relief. He turned back into the room.

"Wray is coming across the street," he said.

He stood at the door till there was a knock on it. Then he threw it open. Wray was standing outside.

"Come in," Eldridge said, and there was a ring of authority in his voice.

Wray stepped inside. Bradley saw that he, too, was under some sort of strain. He looked like a man who had had a bad night. His eyes swept from Rowland to Corlett and came to rest on Bradley.

"Bradley, you chump," he exclaimed, "why did you run away? You've got us in a pocket."

"I—" Bradley began.

"Sit down, Wray," Eldridge said. "We'll soon come to an end of this business."

Wray sat down at the end of the table. Eldridge drew his chair up to the side of it.

"Bradley," Eldridge said, "you've just about played your game out. You've been lying to us all along. We've been a little rough with you, but you brought that on yourself. Now, I'm going to ask you a few questions. If I were you I'd tell the truth. Will you?"

Eldridge raised his head swiftly, and his eyes, suddenly grown bright, were fixed on Bradley's face.

"I've been telling you the truth right along," Bradley said.

"The whole truth?" Eldridge asked.

"The whole truth as far as I can remember anything to tell you."

Eldridge made a gesture of annoyance. He drew a sheet of paper toward him and began playing with it. His eyes were dropped now.

"Well, I'll put the questions to you," he said after a moment. "You can do as you like about answering them. But at first I want to tell you a little about myself. You found out that I arrived here on No. 4 the day I came instead of on No. 6. I didn't take the precaution to find out that No. 6 was late. I was looking for my brother. I learned by calling the office after I had taken this room that he was preparing for a trip over the division. He had just then started for the yards.

"I thought I might overtake him if I went down the road that crosses that overhead bridge. I was standing on that bridge when you carried the body off the track, Bradley. I had just got there as you arrived.

"*I* didn't see my brother killed. I'll say that much for your benefit. But somebody else did. And I want to tell you that, with Rowland's help, I've got the goods on you.

"Now for the questions. Answer them or not, as you like. Of course when you're tried, I'll try to have the questions and answers put in as evidence. Are you ready?"

"Certainly I'm ready," Bradley answered, leaning forward in his chair. "I told you you were playing off your base."

"We'll see," Eldridge said.

He drew a little pile of the hotel letterheads to him. He straightened them out carefully. Then from his vest-pocket he drew a lead-pencil. It was a long, black pencil with silver trimmings.

Eldridge let down the lead in it carefully. He poised it above the paper.

"Now, then," he began.

But Wray leaned forward and took the pencil from Eldridge. For a moment he stared down at it. Eldridge looked at him sharply. But Wray's lids covered his eyes. When he looked up at length they showed only a mild curiosity.

"Where did you get that pencil, Eldridge?" he asked as he handed it back.

"That pencil?" said Eldridge. "I found it in the gravel along the track just where my brother was killed. Now, then, Bradley."

CHAPTER XI.

ELDRIDGE'S SINGLE CLUE.

BRADLEY straightened up in his chair. His fighting blood was thoroughly stirred now. He looked straight at Eldridge.

"Shoot along," he said.

"When did you see my brother after you saw him in the office that day he took your passenger work away from you?" Eldridge asked.

"When I came on him, lying on the track dead."

"Did you know that he was on his way to the yards by way of the track?"

"Certainly not."

"Do you know of any one besides yourself and Corlett who had reason to dislike him here?"

"No."

"Would you kill a man you hated?"

"No."

"Ever have any fights before?"

"Yes."

"Your favorite punch is a blow to the point of the jaw isn't it?"

"If I can land it."

"That's the way you put Dodge down, and he's a bigger man than you?"

"Yes."

"My brother was about as big as you. If you struck him like that he'd go down pretty hard, wouldn't he?"

"Yes."

"Hard enough to kill him if his head struck a rail?"

"I suppose so."

"Isn't it true that you overtook my brother there by the overhead bridge, had a quarrel with him, and struck him? Didn't he fall and didn't you carry him back off the right-of-way so that a train wouldn't strike him? Didn't you run for help and give out the story that he was dead when you found him?"

"That's part of your frame-up," Bradley said angrily. "And I've answered all the questions I'm going to answer. You're no judge. I don't have to talk to you. If you want to take me to jail, you can. I'm ready to go right now. You haven't anything on me."

"Just one thing more—" Eldridge began.

"Not a thing more," Bradley said stormily. "I won't answer another question."

"All right," Eldridge said. "I just want to tell you that we have all the evidence to convict you that we need."

He paused for a moment. While he had talked he had held the lead-pencil poised above the pile of paper. He had written nothing.

Wray had sat with his right hand shading his eyes. From beneath the hand his eyes were fixed on the pencil.

Eldridge turned abruptly to Corlett.

"Corlett," he said, "who killed my brother?"

Corlett, too, had been staring at the lead-pencil. At Eldridge's question he started and looked at him. A little of his unnatural flush faded out of his face. He wet his lips with the tip of his tongue.

"I don't know," he answered.

"Ah," said Eldridge, "that's strange. My friend Rowland here has been nosing about since he has been here, picking up bits of information. He learned that you had first accused Bradley and then myself. What's the matter, Corlett? Has it suddenly occurred to you that men can be sent to prison for perjury? Have you lost your nerve?"

"I haven't lost my nerve for myself," Corlett answered huskily. "But I have a wife—"

"I figured on just that," Eldridge said. "So I wasn't much worried when I heard that you were accusing me."

He was silent again for a moment. He fell to tracing circles on the sheet of paper in front of him. Neither Corlett nor Wray took his eyes from the silver-mounted pencil. Wray had not changed his position. Suddenly Eldridge turned to him.

"Wray," he said slowly, "I lied to you considerably when I first came here. I gave you to understand that I wasn't fond of my brother."

His face took on some of the grayish pallor which Bradley had noticed before.

"I was fonder of my brother than I ever was of any human being up to the time of his death. I told you I was a sort of ne'er-do-well. But I am not that—I have never been that.

"My brother and I were poor kids together, selling papers on the streets of Chicago. You couldn't blame my brother much for having bitterness in his heart. We were hungry a good part of the time. My brother was serious about it. I had a little humor in my system, and I suppose that kept me freer of resentment than he was.

"He had but one goal from the time I can remember. He swore some day he'd be rich and powerful.

"He never lost sight of that ambition. It was like a great white light in his eyes. He never thought of men in the terms of humanity. He only appraised them to see if they could serve him.

"As we grew up we took to railroading. We performed any menial task till we were old enough to fire. My brother was an engineer when he was only a kid, and he was a good one.

"He shot along up till he became a trainmaster. Then when this opening came here, he was offered a chance at it. We had a jubilation the night he left to come here. He swore he'd be president of some railroad in ten years. I kind of believe he would have been if he hadn't been killed.

"I might have known that he was going up against a dangerous game here. He told me there were a lot of old fogies on the road that he'd have to get rid of."

Wray winced, but held his tongue.

"He said he wasn't going to have a man older than himself in a responsible position on the road. He said he would have all the silverheads cleaned out within a year. Yes, that was cruel, and perhaps it was unwise.

"Well, when my brother first came here, it was the first time we had ever been really separated. His offices were in Chicago, and so were mine.

"I'm an electrical engineer, by the way. My brother helped me through school. We'd starved together and fought together, and after he had been gone a few days I was very lonely.

"I thought I'd run over here and have a little visit with him. I came in on No. 4, and when I got to the hotel they were talking about the murder. I went to the undertaker's rooms—and I said good-by to my brother there."

His voice had been sinking, till now it was only a whisper. His eyes were downcast. He had covered one sheet of paper with his circles.

Now he crumpled that up and began on a fresh sheet. Corlett and Wray were still staring at the pencil.

"And I swore there I would find my brother's murderer, if it took me the rest of my life," Eldridge finally went on. "I went to your office with a smile on my lips. I stayed here while they buried

him back home—while strangers buried him. It was pretty hard, but I knew there was no time to lose.

"You gave me a job readily enough because you wanted to keep your eye on me. I sent for Rowland here, and, aided by a single clue, we found out who the murderer was."

"What's that clue?" Bradley demanded hoarsely.

Had they possibly found something that seemed to stamp him as the murderer? Had he lost something beside the track which he did not even now miss?

"We are keeping that till we need it," Eldridge said.

Again that silence fell upon them. Eldridge stopped his tracing with the pencil and leaned back in his chair. He held the pencil by its point, and waved it slowly back and forth.

The boomer cleared his throat. Slowly Eldridge raised his eyes and fixed them on Corlett's face. Rowland and Bradley followed his example. Only Wray did not change his position.

The boomer moved nervously in his chair. Then he rose and walked over to the window.

For quite a while he stood there, staring down into the street. He was motionless now. His little attack of nervousness seemed to have passed from him.

At length he turned back to them. There was a hard, set smile on his lips. He walked straight up to Eldridge.

"I'll take my pencil," he said, holding out his hand.

Eldridge surrendered the pencil without a word. Wray took his hand from before his face and gazed at the boomer. Corlett put the pencil into his vest-pocket.

"That's what you found in the gravel beside the track, isn't it?" he asked.

"Yes, that's our clue," Eldridge assented.

"I lost it there," Corlett said. "It must have dropped from my pocket when I was struggling with Eldridge. I didn't miss it."

Bradley sprang to his feet.

"So it was you, Corlett!" he cried. "It was you that killed Eldridge, then! It was you who put me to all my trouble and worry! I've a notion—"

"That won't get you anything," Eldridge said. "Sit down."

"I'm sorry, Bradley," Corlett said quietly. "If I'd been alone in the world, I wouldn't have lied about you and Eldridge. But there didn't seem to be any other way. Neither of you was married. First I accused you, but when I saw that Eldridge seemed to be a boozer, a good-for-nothing, I turned on him. He seemed to have the least to lose."

He passed his hand across his eyes and went on more rapidly:

"I met Eldridge's brother down-stairs that night and asked him for work. That was all I wanted—just work. He just about laughed at me. He just about told me I was no good. He didn't know how I had tried — how I had been tempted since I've been here.

"I was crazy when we parted. I saw he started down the track, and I followed him. I begged him not to turn me down altogether. He laughed at me, and he—he called me a name that a decent man couldn't stand for. No man could have stood for it, even if he had been decent only just so long as I have been. So I smashed him on the jaw.

"He went down like a log. His head struck the rail. He lay still. I tried to rouse him, but of course I couldn't.

"Then Bradley came into sight down the track. I hid under the bridge. I knew Bradley would take the body off the track. When he did, and went back to the dock to report Eldridge's death, I went home.

"I'm sorry I accused you men. You can do what you like with me now.

"I tried to come back, but I guess it wasn't in the book for me to do so. Anyhow, I made the fight till it went against me so strong I couldn't stand it any more. You haven't any idea what it meant to me to be out of a job just then. That's all."

He sank into his chair and slumped down in it, a beaten, helpless figure of misery.

Rowland got up and went and stood by his chair. Eldridge looked at Wray.

"That ends it, Wray," he said in a low tone. "I'm glad it wasn't a better man, though I'm sorry for poor Corlett. I accused Bradley, and brought him here because I was sure that Corlett wouldn't go through with it. I knew his nerves weren't very steady. Well, I guess we may as well take him over to the station."

He rose and put on his overcoat. Rowland touched Corlett on the shoulder.

"Get up!" he said sharply.

Corlett rose rather stupidly. Rowland handed him his overcoat, and he slipped his arms into it.

His eyes now were fixed dumbly on Wray, as if he pleaded with Wray for a last kind word. But Wray had not moved.

"Will you come with us, Wray?" Eldridge asked.

"Just a minute," Wray said.

He was frowning down at the table. His broad face had lost its look of health. He seemed suddenly to have become a very old man.

Corlett was the first to move. He stepped quickly to Wray's side. His daze seemed suddenly to have left him.

"Wray," he said, "don't mind about me. Don't feel bad. You've been mighty good to me, but I guess it wasn't any use. I guess I was doomed to come to this kind of an end.

"I was my own worst enemy for years. I tried to make amends at the last, but it wouldn't work out. I guess a man can't play the game most of his life and then make good in the little while that remains for him. You just forget about me, Wray."

Wray got to his feet. He faced Eldridge.

"This 'll be about enough of this farce, I guess, Eldridge," he said. "That's my pencil Corlett has. I killed your brother. Somehow or other, you've found it out. You figured that I wouldn't let another man suffer for me.

"You figured right. I won't. I've got my home and my child. I'd have protected her and it to the limit by keeping quiet if nobody else was to suffer. But if the debt has got to be paid, I'll pay it. I've stood the gaff for a good many years, and I can stand it now."

He flung up his head proudly, and a little color came creeping back into his face. He seemed to have expected a burst of anger on Eldridge's part, but Eldridge only dropped back into his chair and covered his face with his hands.

"I knew it was true," he said huskily, "but I hoped, somehow, to the last minute that it wasn't."

CHAPTER XII.

HOW IT ENDED.

WRAY, a veteran of thirty years, who had stood by men facing disaster many times, and had once or twice extricated them from it, had nerved himself for a violent outbreak on Eldridge's part. Eldridge's sudden action swept him off his feet. He didn't know what to say.

Rowland was professionally silent. Bradley was amazed. Relief, and then grief that his old friend had not let him bear his burden, showed in Corlett's face.

At length Eldridge looked up. His face was haggard.

"Why did you do it, Wray?" he asked. "Why did you kill my brother?"

"You liked your brother because you had been through the mill with him," Wray said. "You were blind to his faults. He was a man who lacked sympathy. His own ambition ruled him. He was a hard man. I don't say that he hadn't had his knocks. I guess most of us get them. I've had mine.

"I've worked at this railroad game, man and boy, for a good many years. I haven't climbed very far, but I've never climbed over any man yet. I've tried to give a man a hand as I went along.

"That's why Corlett wanted to go to jail in my stead. I helped him when things looked blue for him. Your brother wanted to cast him aside as if he didn't count. He was doing his work, all right. Why didn't your brother let him stay?

"Perhaps your brother was right in Bradley's case. I don't know. But he was rough with Bradley.

"He was insolent to me. I don't know it all about this railroad game. No man does. But I know a little about it. I thought I knew as much about it as your brother did. He talked to me like I was an office-boy. He told me to meet him to go over the division. He sneered out that he thought he'd keep me busy. I was pretty mad.

"After he left the office I got to thinking about Corlett. My heart ached for him. I was afraid he might hurt himself in his despair. So I went over to his house. He hadn't got home.

"I knew he came home along the track sometimes, and I started back that way. Just this side of the overhead bridge I met your brother. We stopped, and I made another plea for Corlett.

"Your brother was pretty savage. He said I was annoying him by mentioning Corlett again. He said I'd have to learn to do as he told me if I expected to remain on the road. I told him I didn't have to remain on the road. I thought I could get a job somewhere else.

"'Well,' he said, 'you'd better start looking for it right now. I had it in my mind to let you go, anyhow. I tell you, you're a bunch of fossils. You don't know what real railroading means.'

"'I quit right now,' I said. 'But before we part I'm going to tell you what I think about you, since you've been so kind as to pay your compliments to me.'"

The trainmaster paused to wipe his forehead with his handkerchief. Some of the resentment he had felt against Eldridge's brother was in his eyes now.

"I'm a good deal of a roughneck, I suppose," he pursued. "I didn't choose my words when I told your brother my opinion of him. I was fighting mad. I've had a considerable to do with making this road what it is. I've worked early and late. I've given the best of my life to it. He had no right to talk to me as he did.

"We were standing not more than two feet from each other while I spoke. I looked him square in the eye. He was no longer my superior officer. We were man to man, expressing our opinions.

"I could see he was getting mad, too—mad clear through—and I was rather glad. When I finished, I expected he'd come back at me. But he just stood staring at me a minute, and then he slapped me across the mouth.

"Well, I'd never taken a blow from any man without giving one in return. I didn't suppose I could lick him, but I was going to try. I smashed out at him with my right fist. The blow caught him on the jaw. He went down like a log.

"I heard his head crack against the rail. The sound of it was like an eggshell being crushed. I bent over him and shook him and called to him to wake up, but he couldn't wake up. Somehow, I finally knew he was not unconscious. I knew he was dead.

"While I was pondering what to do, I saw Bradley coming. I drew back and let Bradley take care of the body. There was nothing more that anybody could do. I went to the office.

"Well, we'd better go over and see the chief of police. I'd have told my story long ago if it hadn't been for my daughter. It 'll be pretty hard for her."

Eldridge sat staring for a minute. Then he turned to Rowland.

"That's all, Rowland," he said. "I'll see you in your room after a bit."

Rowland nodded and went out.

"I'm glad you sent him away," Wray said. "I don't fancy detectives. I'll go to the station peacefully enough."

"You're not going to the station," Eldridge said.

"Not going?" Wray repeated blankly.

"Wray," Eldridge said in a low voice,

"your daughter identified that pencil of yours for me."

"My daughter?"

Wray took a step forward, his face red with anger.

"Don't you go dragging her into this, Eldridge. By Heaven, I'll—"

"No, you won't," Eldridge said. "I sought an acquaintance with your daughter as soon as I suspected the pencil was yours. The reason why I thought it was yours was that in your office that afternoon you fumbled for a pencil while we were talking. You pulled out an ordinary pencil and held it in your hand. Once in a while you'd take hold of the end of it and attempt to turn the silver cap that wasn't there.

"As soon as I found this pencil in the gravel, when I went hunting there for whatever I could find, I decided it was yours. When I showed it to your daughter, she identified it. It was a gift from her to you, she said. I said I'd return it to you.

"I've returned it to you. You recognized it as soon as I pulled it out of my pocket this morning. I'll tell you why I brought you here, Wray, and why I brought Bradley and seemed to accuse him. I thought you were square. I figured you had struck my brother in anger. I didn't believe that you would let an innocent man suffer. And that's the way it worked out.

"But this isn't the end of it. I don't know what to do. I can't have your daughter hurt, Wray. I've seen her only a few times, but I—I love her already."

"Ah!" Wray said.

Once more they were silent. Outside the sky had darkened, and snow was beating down against the pane. There was twilight in the shabby little room.

Eldridge spoke:

"It's up to you, Wray. So far as I am concerned, you are free. I can't do anything else."

"I resigned this morning," Wray said heavily. "If no one was arrested for your brother's murder, I figured on going away. I wouldn't have stayed here, no matter what had happened. It wouldn't have seemed right.

"But, Eldridge, I didn't murder your brother. Men meet like that sometimes, and one of them dies. I had no murder in my heart. If your brother hadn't struck me, he would still be alive."

"Well, you'd better go," Eldridge said. "I guess you're safe, so far as Bradley and Corlett are concerned."

Wray took up his cap and walked to the door. There he turned and stood looking at Eldridge. A struggle showed in Eldridge's face. But he at length mastered himself and walked across the room and put out his hand to Wray.

"Well, good-by," Eldridge said.

"Good-by," said Wray.

He opened the door and passed out. Corlett crossed the room swiftly and followed him. Bradley and Eldridge were left alone.

"Bradley, I beg your pardon," Eldridge said. "I wronged you."

"Never mind that," Bradley said. "I can see you're suffering. But you'll get over that. Say, I was standing at the top of the stairs in Wray's house the night you said good-by to Miss Wray. There was a look on her face— Well, if I were you, Eldridge, I wouldn't lose any time in going to see her."

"You think there's a chance?" Eldridge asked.

"Chance?" Bradley repeated. "Didn't you see the look on her face? I guess if you'll just go to see her, you'll find out how she feels."

"But I've only known her a few days."

"You've had your nerve right along," Bradley said. "I wouldn't lose it now if I were you."

"It's the hardest thing I've ever tackled," Eldridge said. "But I'll go right now."

They went down into the street and parted there. Bradley walked rapidly toward Annie's home. Eldridge went up the hill.

Annie had just risen. She looked as

if she had not slept. But at sight of Bradley her face lighted up and her color came back. Bradley thought she was prettier then than she had ever been.

"It's all right," he said. "I'll tell you what I can about it."

"I know it's all right," she said. "I can see it in your eyes. Oh, Danny, it's more than all right. What has happened to you?"

"I don't know," Bradley answered. "Why?"

"You're just now what I hoped you would become after a long while," she answered. "You're changed; quieted, somehow. I'm not afraid for you any longer."

"I've been through the mill and seen a couple of other men go through," Bradley answered. "Ah, Annie, we'll have done with waiting. I don't know whether I'll ever get a passenger run or not, but I guess we can get along if I never do. You call up the old man to-night and tell him you're through. I'll lay off, and we'll be married to-morrow. Will you, darling? Will you?"

She took his face between her hands.

"I'd marry you now if you had no job at all," she said. "You're just what I've been waiting to have you become. Oh, Danny, I was afraid for you sometimes when you lost your temper. But that's all over, isn't it?"

"It's all over," he said, and he kissed her willing lips.

(The End.)

YOU WITH THER SWELL'D HEAD.

BY JACK HYATT, JR.

YOU with ther swell'd head,
Whadderyer mean?
Yer ther same
Clay;
He made's all
'Like!
Jest 'cause yer rich
An' good-lookin'
Yer makin' yerself
Stuck up.
Why?
Foolish!
Can't yer see?
No friend—no enemy—
Just dislike!
Takes'r *man*
Ter have enemies.
Have'r heart!
Kiplin' sez,
"Even's you'n' I."
Yer no better!
You with ther swell'd head,
Whadderyer mean?

On the Editorial Carpet

Where We Gather in the Hut, Tell Our Troubles, Help One Another, and Sing Some Old Songs.

"JEAN STEWART, clean, wholesome, brimming with vitality because of the sheer happiness of living, with a healthy young body that was just rounding into the fulness of womanhood, was the night operator at Silver Hill, a bit of slate-colored station at a lonely spot on the Midland Division of the Q. O. and R."

That is the way in which the author starts the best story he has yet written—

JEAN, "NITE OPR."

BY BUCKLEY OLCOTT,

Author of "Canned," "Jericho Jones's Black Smoke," "'Carrie' McGorry and X2641," "Woe of a Come-Back Smoke," etc.

A RAILROAD NOVELETTE COMPLETE.

HITHERTO all, or nearly all, of Mr. Olcott's stories have been of a humorous character. In this one, however, he strikes out into a new field—the tensely dramatic—and strikes out into it with distinct success.

You will like *Jean*—like her for her pleasantness, her good looks, her high spirit, her competence, and above all her intrepidity. And you will follow with the most anxious interest the great adventure into which she plunges and from which she emerges victorious.

DONALD McNICOL has an article on submarine cables of the world—so far as we know, the first complete and authoritative history of the submarine cable and description of all the systems now in operation. The article is illustrated with a profusion of fascinating pictures and maps. It will be of interest to both the technical and the general reader.

BY the time this type reaches your eye the longest continuous double-tracked railroad tunnel in the western hemisphere will in all human probability have been completed and in operation—the Connaught Tunnel, constructed by the Canadian Pacific under Mount MacDonald in British Columbia for a distance of five miles. "A five-mile tunnel in that section of the Selkirk Range? Impossible!" you say—or would, if you knew that section of the country. Ah, but, gentle sir, anything is possible to C. P. R. engineers—though some things are occasionally a bit difficult. Max Enos, an official of the company, will tell you how this incredibly difficult engineering feat was carried through. Lots of pictures.

FOLLOWING the publication of his article, "Old Times with 'Morse' Men," "J. E. M." received a large number of letters requesting him to write some reminiscences of bygone days in telegraph offices other than those located in New York. So he has obligingly sat down and written some entertaining recollections of old-time offices, chief operators and "blocks" in such centers as Chicago, St. Louis, New Orleans, Memphis, Indianapolis, Galveston, and San Francisco.

If his stories and anecdotes don't get to all brass-pounders whether they be old-timers or not, I miss a good guess.

CLAUDE WASHINGTON concludes his series of articles in which he has been telling "The Story of the Passenger-Train" with a paper on "The Luxury of Travel." Turn to the "Help for Men" department in this

issue, read Mr. Washington's article there, and see for yourself if you won't be eager to finish this informative series.

A GENERATION ago every consignment of valuables shipped *via* Wells-Fargo Express in the Rocky Mountain States was accompanied by a messenger armed with a sawed-off shot-gun. If any bold, bad man should try to stick up the stage-coach which carried the treasure and the shot-gun toter—and there were such bold bad men, lots of 'em—there was sure to be a fight, at the end of which there would be either a dead bandit or a dead messenger. Ah, those were the thrilling days in what was probably the most dangerous occupation on earth—the occupation of treasure-guard. A few of these Wells-Fargo old-timers are living still. Oliver Roberts is one of them, and one of the most famous of them. Next month he'll tell you about some of his early experiences in the grueling man-games of the Sierra mining-camps, guarding express and trailing desperadoes.

WE'RE just as perky as we ever were over the quality of our short stories. And they never came any better than they will next month. You see!

THE RAILROADER'S MAIL-BAG.

PUZZLES, especially switching problems and mathematical acrobatics, seem to possess a peculiar fascination for railroad men. Every time we print such a problem, we are flooded with answers for weeks thereafter, and quite often the correspondent accompanies his solution with yet another sticker. To the credit of the boys, let it be said that the answers they send in are nearly always right, and that the stickers they compose themselves almost invariably require keen brains to work them out. Naturally, with such a huge number of correct solutions coming in, the ones that we pick for publication are selected more or less by haphazard. So don't be discouraged, boy, because your letter isn't printed this time; but try, try again, and first thing you know, if you stand in the way long enough, the lightning will strike you, too.

MR. TILLMAN'S PROBLEM.

This month's batch of answers refers to the following problem, published in the RAILROAD MAN'S MAGAZINE for November, 1916:

A man goes into a store and says:

"Mr. Merchant, give me half as much money as I already have and I will spend three dollars with you."

The merchant did and he spent three dollars. He did the same with two other merchants and when he came out of the third store he was broke. How much money did he have when he went into the first store?

THOMAS TILLMAN.

Box 458,
Bend, Oregon.

SOLUTION TO MR. TILLMAN'S PROBLEM.

Let X equal the number of dollars he had when he went into first store.

Then: X plus ½X minus 3 equals what he had when he left first store, or what he had when he went into second store.

Then: (X plus ½X minus 3) plus

$$\frac{\text{X plus } \frac{1}{2}\text{X minus } 3}{2}$$

minus 3 equals what he had when he left the second store, or what he had in the third store.

EXPLANATION:

When he entered the third store he had such an amount that when half of that amount was added to it, it would make $3; then for simplicity of handling figures we will call that amount (two halves), or, to make it still plainer we will say that we will divide that amount, whatever it may be, into two equal parts. Then the merchant gives him an amount equal to one of those parts, and the three parts total $3; therefore one part would certainly equal $1 and the two parts he entered with would equal $2.

Then: (X plus ½X minus 3) plus

$$\frac{\text{X plus } \frac{1}{2}\text{X minus } 3}{2}$$

minus 3 equals 2.

Multiply through by 4 so as to eliminate fractions; we get: 4X plus 2X minus 12 plus 2X plus X minus 6 minus 12 equals 8.

Transposing we get: 9 X equals 38; X equals $4 2-9=what he had in the first store.

Proving this: He starts out with 4 and

two-ninths dollars. First storekeeper gives him two and one-ninth dollars which makes six and one-third dollars. He spends $3 with him which leaves him three and one-third dollars out of first store, or into second. There he gets one and two-thirds dollars; this makes $5. He spends $3, leaving him $2 out of second or into third store. There he gets $1, making $3. He spends $3, then broke. To make it more plain, he started out with four dollars twenty-two and two-ninths cents.

GEO. L. BURGER.

Soo Line,
North Fond du Lac, Wisconsin.

(FURTHER PUZZLE: Who made change out of a cent for him?—ED.)

SOLUTION NUMBER TWO.

The next correspondent goes at the problem rear-end foremost, and just for good measure throws in a cerebellum wringer of his own. As thus:

Having just finished reading the November number I feel railroading coming on me again. First, I want to answer Thomas E. Tillman's brain-teaser. The way I figured it out, was to commence at the caboose, or tail end.

If each merchant gave him half as much as he had when he came in, he had two dollars when he went in the last, or third store, so he had three dollars after the merchant gave him one dollar, and then he spent the three dollars and was broke.

He had five dollars after the second merchant had given him half as much, or one-third of the five dollars, which is one dollar sixty-six and two-thirds cents, so that he must have had three dollars, thirty-three and one-third cents when he came into the second store. Therefore, he spent three dollars in the first store, which would have made him have six dollars thirty-three and one-third cents after the first man had given him one-third of that amount—two dollars, eleven and one-ninth cents. This would leave him four dollars, twenty-two and one-sixth cents when he came into the first store.

Now we will take it the other way. He had $4.22 1-6. The first man gave him half that much, which is $2.11 1-9, making a total of $6.33 1-3. He spent $3, leaving $3.33 1-3.

The second merchant gave him half that much, $1.66 2-3, making a total of $5. He spent $3 and had $2 left when he went into the third store, so the third merchant gave him half that amount, which is one dollar, making a total of three dollars, and he spent that and went broke.

Now I have one for you:

A man had $100 and wished to invest it in 100 head of live-stock. He paid $10 per head for cows, $3 per head for hogs, and 50c. per head for sheep. Now how many cows, how many hogs, and how many sheep did he have?

A. L. BUTCHER.
(An Old Timer)

Maryville, Tennessee.

YOU CAN'T KID US!

Another ingenious scribe, who signs himself "A Reader," expects to get a rise out of Mr. Tillman, or out of me, or both, with the subjoined communication. You'll get fat, "A Reader," kidding this bunch:

If it were not Friday, the 13th, I certainly would not subject myself to the ridicule, however good-natured it might be, of the "gentleman from Oregon" which will probably be my unfortunate lot to receive when he hears of this letter, which I have the temerity (on account of the date mentioned above) to take for granted. But he issued a challenge which I chanced to read in the November number of your magazine.

I have always prided myself on my mathematical calisthenics (whatever kind of an animal that may be); but I merely want to relieve my mind from the strain of figuring which has been necessary, to arrive at a solution of the "brain-teaser" submitted by Mr. Tillman. The following is my humble offering of a solution:

The man mentioned in the problem must have had $2 when he entered the first store, and by the donation of $1 from the merchant, was enabled to spend the $3 as mentioned in the early chapters of the "touching" narrative. In my opinion Mr. Tillman merely neglected to mention that the man was broke before he saw the second merchant.

A READER.

Shreveport, Louisiana.

IS HE RIGHT?

SOME time ago Mr. Al Young asked a question through the columns of this department which nobody has yet found the answer to, so Mr. Young herewith supplies the response himself:

I have not seen any answers to my own query, "What would be the course of a ball fired at the rate of a mile a minute

from a gun pointing backward from a train running at the same speed?" Here it is, although at first it seems improbable:

The ball would drop directly to the ground on a vertical line!

Think it over.

AL YOUNG.

Columbus, Ohio.

AND STILL THEY COME!

MR. A. B. DELISLE wants us to fritter our time away in solving still another problem. He is kind enough to give the answer. See if you can tell how he gets it:

Although I am not a subscriber to your magazine, I have been reading same for some time and like all of the stories, but am particularly interested in the problems and puzzles.

The following is a problem that should keep the boys guessing for a while:

A messenger leaves the rear of an army 25 miles long as it begins its day's march. He goes to the front and at once returns, reaching the rear as the army encamps for the night. If the army marched 25 miles, how many miles did the messenger travel?

The correct answer is 60.3+

In the problem of the cannon mounted on a flat car, let the cannon be pointed at right angles to the car and see what the result is.

A. B. DELISLE.

1,678 Howard Street,
San Francisco, California.

THE OLDEST ENGINEER.

SOME years ago we printed a short item recording the death of Joseph H. Slater, who was regarded as the oldest locomotive engineer in the world, inasmuch as he purported to be an associate of George Stephenson in building the famous locomotive, the Rocket. The place and date of Mr. Slater's birth were given as Sheffield, England, 1830. As this was the same year as that in which Stephenson completed his epoch-making engine, we ventured to call attention to this obvious discrepancy in dates. The whole matter has now been cleared up in the following letter just received from a daughter of Mr. Slater:

There is no question about it, Mr. Joseph H. Slater at the time of his death was the oldest engineer, having been associated with George Stephenson, serving as an apprentice and guiding the Rocket on its runs between Liverpool and Manchester. It was his father, *John Slater*, who assisted Stephenson in the construction of the famous engine, the Rocket.

I am Mr. Joseph H. Slater's youngest daughter.

MRS. CELIA SLATER DE YETT,
617 South 16th Street, East,
Cedar Rapids, Iowa.

BALM FOR THE WOUNDED.

TWO sensitive souls wrote in during the past month, complaining of insinuations against their native heaths. One objected to having Winnemucca, Nevada, referred to as "only a frontier village on the alkali plains," while the other resented the accusation that the Kansas City, Osceola and Southern's train-connections "are not the best in the world." Gentlemen, we apologize, jointly, severally, and humbly. The letters:

TRAIN-CONNECTIONS ARE FINE.

In your November issue, Page 573 I noticed a discussion regarding the Frisco Line between Kansas City and Springfield. Mr. Holland comes forward with the information that the official name is the Kansas City, Osceola and Southern.

By that name does he mean the main line from Kansas City through Springfield to Memphis? And if so, what is the fault with the train-connections, which, he asserts, "are not the best in the world."

There are four through trains a day between Kansas City and Memphis—Nos. 103, 104, 105, and 106, the latter two carrying through sleepers and making the run in about fourteen hours.

F. SNOW.

Boston, Massachusetts.

A WINNEMUCCAN'S PROTEST.

Here is the letter from Mr. T. E. Killgrove, complaining about our animadversion on Winnemucca, together with the reply which he received from the expert who conducts our Telegraphic and Telephonic Department, in which said animadversion originally appeared:

As a regular reader of the RAILROAD MAN'S MAGAZINE I always find in it something interesting, something instructive and something amusing.

I hope, however, your sources of information are generally more accurate than that from which you answered G. O. J., Norwich, Connecticut (page 503 of the November issue just at hand).

This is not the first time I have seen reference to Winnemucca as though it were only a sagebrush setting for a Western Union substation.

The fact is Winnemucca is one of the five or six largest cities in Nevada, of which the Western Union with its two-story building and ten or twelve operators comprise a mere detail.

Winnemucca is county seat of the second largest county in the State; is a railroad and mining-center; carries bank-deposits of around four million dollars, and it is claimed more automobiles have been sold here during the past year than in any other city in the State excepting, perhaps, Reno.

Would be glad to have you send this to your Norwich correspondent.

T. E. KILLGROVE.

Winnemucca, Nevada.

DEAR MR. KILLGROVE:

We were glad to receive your loyal boost for your own town, and in an early issue of the RAILROAD MAN will see to it that your account of Winnemucca's status among the cities of the West is given due publicity.

The party who answered the inquiry you refer to was for several years a resident of Salt Lake City, surveyed wire-routes between Salt Lake and Reno, and was in Winnemucca as late as the year 1910.

As we understood the inquiry it did not call for statistics relative to Winnemucca's commercial standing, but asked for light as to why the name of your city appeared so frequently in articles dealing with trans-continental wire service. This information seems to have been given in a manner quite creditable to the town as a very important telegraph and telephone center.

We are glad you like the magazine, and shall be glad to hear from you any time anything appears therein which does not meet with your ideas of accuracy.

RAILROAD MAN'S MAGAZINE,
Telegraph and Telephone Department.

WHERE PINE BLUFF IS.

A FEW words from a geography sharp, together with the soft answer made thereto by the offending contributor:

> What was the matter with "J. E. M." when he wrote "Old Times on the Cotton Belt"? Please note page 82, September number. He had Pine Bluff on the Red River. When did this change happen?
>
> I always heard it said it was on the Arkansas River, in fact I know it is, for I was in Pine Bluff a few days ago and a party advised me it was on the Arkansas River. E. W. MURRAY.
>
> Monroe, Louisiana.

In regard to Mr. Murray's comment upon the location of Pine Bluff, Arkansas—that it is on the Arkansas River, and not on the Red River—I desire to say that Mr. Murray is absolutely correct. The Red River lies farther south.

This, however, was merely an error in my geography. I trust that Mr. Murray will pardon my error, and hope that on his visit to Pine Bluff he had a good time; few railroad men who visit that place fail to have it.

I am very glad to know that Mr. Murray takes so much interest in the RAILROAD MAN'S MAGAZINES and in my articles as to "call me on the carpet" for any error that I may make.

Won't some other readers please step forward?

With best regards to Mr. Murray.

Sincerely, "J. E. M."

A HUNCH FOR OPERATORS.

A HUNCH from a contributor who has long retired from both the railroad and the telegraph game, but who hasn't lost his love for either. Our informant is not only willing to return occasionally to either of his old occupations when an occasional good-thing odd job heaves in sight, but more than that he is game to pass the tip along. This information he gives bears the date of October, so that by the time it reaches you it may prove to be ancient history. Anyway, the contributor's letter is:

> Good A. P. operators are in great demand here in the Southwest now. Although I am supposed to be farming and am engaged in seeing that the horny-handed hired hand does not soldier too much, I was dragged away from my $1.60-per-bushel wheat field to take the world's series games for a newspaper here. There wasn't a man in Kansas City, Omaha or St. Joe who could interpret Phillips code—and I am charging them $10 per day for doing it—a modicum of $5.33 a day more than the scale. Good operators could land here easily, but hams, would-be's and has-beens—never.

ADDRESS WANTED.

INFORMATION is wanted of the whereabouts of Allie A. Farnsley, 6 feet in height, about 200 pounds; auburn, curly hair, brown eyes. Last heard of in Louisville, Kentucky. Any information concerning him will be appreciated by his daughter, Mrs. FANNIE DEATRICK, 811 Topeka Avenue, Topeka, Kansas.

SONGS BY BARDS OF THE RAIL.

O'CONNOR'S RIDE.

THE shades of eve had fallen
On a gloomy, wintry day,
When O'Connor to his helper
These simple words did say:

"Run out the little Buda
And put her on the track.
I've lost my eight-inch pliers;
To Columbus we'll go back."

Joe opened wide the throttle,
Bacon pushed her from the rear,
And in just eleven minutes
Rapids' passing-track drew near.

The 2A signals beckoned;
All lights were green, all clear.
On sped the little Buda;
They lost all sense of fear.

The wind blew through their whiskers,
The air grew damp and cold,
But still on toward Columbus
The little Buda rolled.

"What place was that?" yelled Bacon.
Joe answered: "I don't know.
We're bound to make Columbus,
So onward let us go."

Around the bluffs they rumbled,
The Yellowstone in sight;
The chugging of the Buda
Disturbed the chilly night.

"Hold! Stop! Put on the air!"
Fred Bacon then did cry.
"I see a rock upon the track,
We cannot pass it by."

Joe grasped the brake, put on the air
Reversed her on the spot,
With might and main he slid the wheels
And stopped her on the dot.

"We cannot move this mighty rock;
It's far too large for two.
It's big enough to wreck a train,
And No. 4 is due."

A happy thought then dawned on Joe:
"I know the very stunt!
We'll open up the relay box
And then put on a shunt."

The signal went from clear to stop,
The rear one just half-way;
The fertile brain of faithful Joe
Had surely saved the day.

The flagman sped around the bluff
His lantern in his hand,
A look of fear was on his face
As the darksome track he scanned.

In accents loud to Joe he yelled,
"What makes the signals red?"
"A five-ton rock is on the track
Around the curve," Joe said.

Just then a headlight hove in sight,
Turned darkness into day.
'Twas fast express train, No. 4,
Feeling cautiously its way.

Expert Jones jumped from the train,
All smiles and out of breath.
"The 2A signals now," he said,
"Saved the passengers from death."

The engineman a vision had
Of the wreck that would have been,
Had not the 2A signals shown
The danger he was in.

Joe's pliers still remain unfound,
But what cares he for that
Since due to grateful passengers
He wears a Stetson hat?

—DAY AND DE FRANCE.

CARLTON'S TRAIN.

'MID terrible booming of thunder,
Sharp lightning and deluge of rain,
Came tidings of death and disaster
To Carlton's ill-fated train;
Where the wind's sudden rise in its fury
Soon blew in a merciless gale,
And sent flying along from the siding
A car to spread death on the rail.

'Twas a night when the bravest might falter
With heart-stricken fear and despair,
For it seemed as if legions of demons
Were out at war with the air;
But the tide of humanity flowing
O'ercame every feeling of fright
In the rescuing-party who labored
So bravely that terrible night.

A sight that will ne'er be forgotten
While reason presides in the brain,
To behold the dead and the dying
Who rode on that ill-fated train.
Heaven pity them all! Here's one other
Whose equals on earth were but few;
He's my noble professional brother
Who proved what a brave man can do.

A. F. S.

"Indoor cheer all the year!"

The first winter spent in a radiator heated home awakens the same keen delight that a tropic climate bestows upon the traveler from winter lands. Radiator climate soon becomes so necessary a part of the home life that the whole family wonders how it ever got along without their comfort-guaranteeing outfit of

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Radiator heating will work a wonderful transformation in your house. Its *living* space will then equal 100% of its *entire* space right up to the glassed-in porch.

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Insist on IDEAL Boilers and AMERICAN Radiators which will give you indoor cheer as long as you live. They are fully guaranteed and cost no more than inferior makes. They need no water works supply, as same water is used for years. Easily put in old buildings, without disturbing present heater till ready to fire the new IDEAL.

A No. 5-22-W IDEAL Boiler and 447 feet of 38-inch AMERICAN Radiators, costing the owner $235, were used to heat this cottage. At this price the goods can be bought of any reputable, competent Fitter. This did not include cost of labor, pipe, valves, freight, etc., which vary according to climatic and other conditions.

Our catalog "Ideal Heating" (free) is a volume of concise heating and ventilating information which every owner or tenant—small or large—in town or country—ought to have. Write us today. All inquiries cordially welcomed. No obligations to buy.

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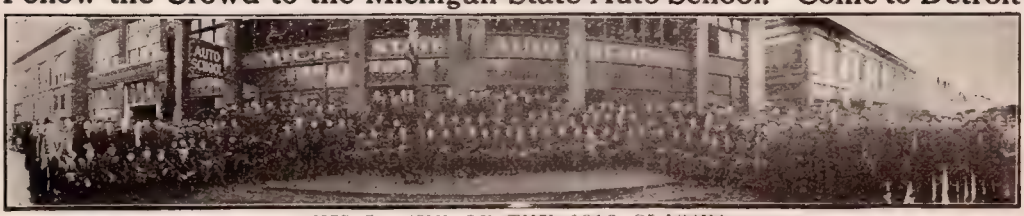
Detroit Is the Place to Learn—Start Any Time

There are 44 auto factories in Detroit, and 140 accessory and parts factories. Our students have the privilege of going thru any or all of them. We now **operate Westinghouse Auto-Lite and Bijur Service Stations.** After careful consideration the Westinghouse Electrical & Mfg. Company, the Auto-Lite Company and the Bijur Co. decided that our school was the best to handle their service stations. This has added thousands of dollars worth of equipment and makes our electrical department unequaled. Students get actual experience and training in handling all kinds of electrical auto equipment and taking care of trouble. We have constantly a greater demand for our graduates than we can meet. Factories and garages are paying big salaries to men who **know** how to handle electrical equipment quickly and properly. These are special advantages offered in our school. Detroit is the automobile center. You get practical instruction. Come to our school and learn the auto business right. School open all the year. Enter classes any time, any day. Three classes daily: morning, afternoon, evening.

There is a great demand for Michigan State Auto School students. Garages throughout the country write us for men. Auto factories write and phone for men constantly to fill permanent places. Why not fit yourself with one of these good paying positions?

Follow the Crowd to the Michigan State Auto School. Come to Detroit



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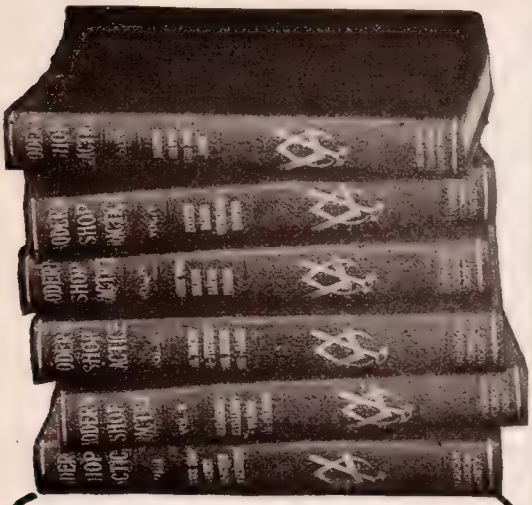
Michigan State Auto School

The Old Reliable School **A. G. Zeller, President**

241 Auto Building

687-89-91 WOODWARD AVENUE—11-19 SELDEN AVENUE

DETROIT, MICHIGAN, U. S. A.



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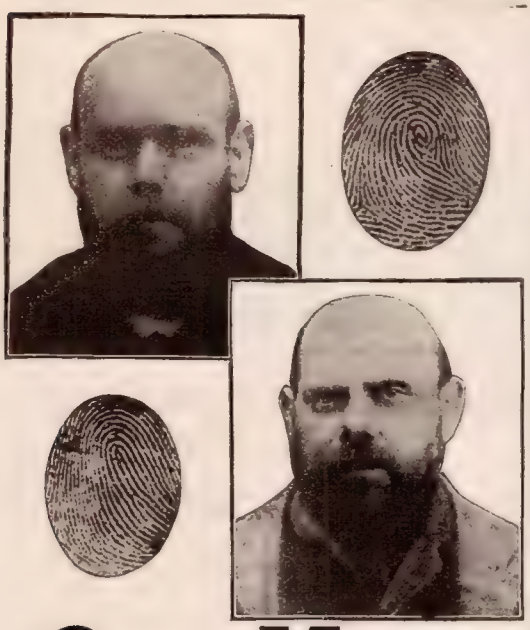

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Statement of the ownership, management, etc., of THE RAILROAD MAN'S MAGAZINE, published monthly at New York, N. Y., for October 1st, 1916. Required by the Act of Congress of August 24th, 1912.

NOTE—This statement is to be made in duplicate, both copies to be delivered by the publisher to the Postmaster, who will send one copy to the Third Assistant Postmaster-General (Division of Classification), Washington, D. C., and retain the other in the files of the Post-Office.

State of NEW YORK } s.s. :
County of NEW YORK }

Before me, a Notary Public, in and for the State and County aforesaid, personally appeared WM. T. DEWART, who, having been duly sworn according to law, deposes and says that he is the General Manager of THE RAILROAD MAN'S MAGAZINE, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24th, 1912, embodied in Section 443, Postal Laws and Regulations. To wit:

That the names and addresses of the Publisher, Editor, Managing Editor, and General Manager are:

Publisher—THE FRANK A. MUNSEY COMPANY, 8 West 40th Street, New York, N. Y.

Editor—ROBERT H. DAVIS, 8 West 40th Street, New York, N. Y.

Managing Editor, ROBERT H. DAVIS, 8 West 40th Street, New York, N. Y.

General Manager—WM. T. DEWART, 8 West 40th Street, New York, N. Y.

That the Owners are: (If a corporation give its name and the names and addresses of stockholders owning or holding 1 per cent or more of total amount of stock.)

THE FRANK A. MUNSEY COMPANY, 8 West 40th Street, New York, N. Y.

FRANK A. MUNSEY, 8 West 40th Street, New York, N. Y.

That the known bondholders, mortgagees, and other security holders, owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are:

There are no bonds, mortgages, or other securities against THE FRANK A. MUNSEY COMPANY.

That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

WM. T. DEWART, General Manager.

Sworn to and subscribed before me this 2d day of October, 1916.

A. V. KASS, Notary Public.
New York County, No. 238.
New York Register No. 8190.
Term expires March 30th, 1918.

{ SEAL }

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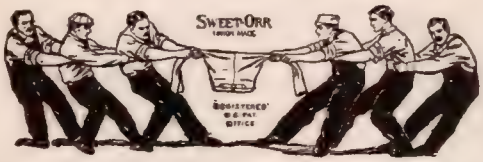

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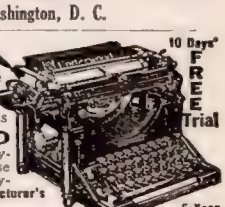

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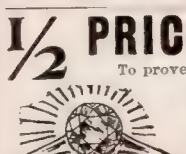

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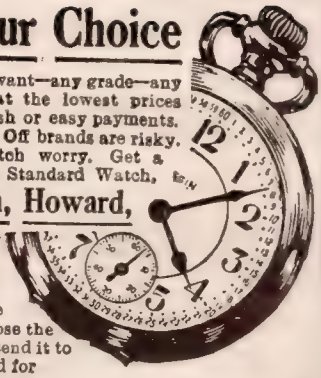

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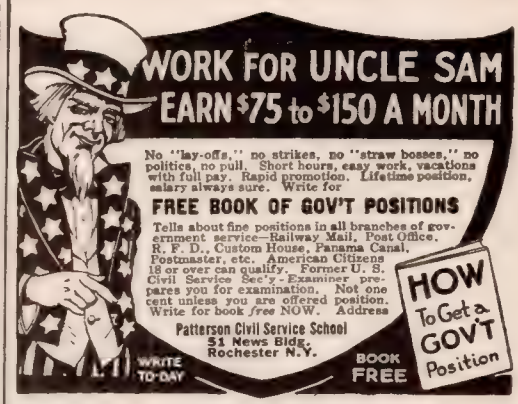
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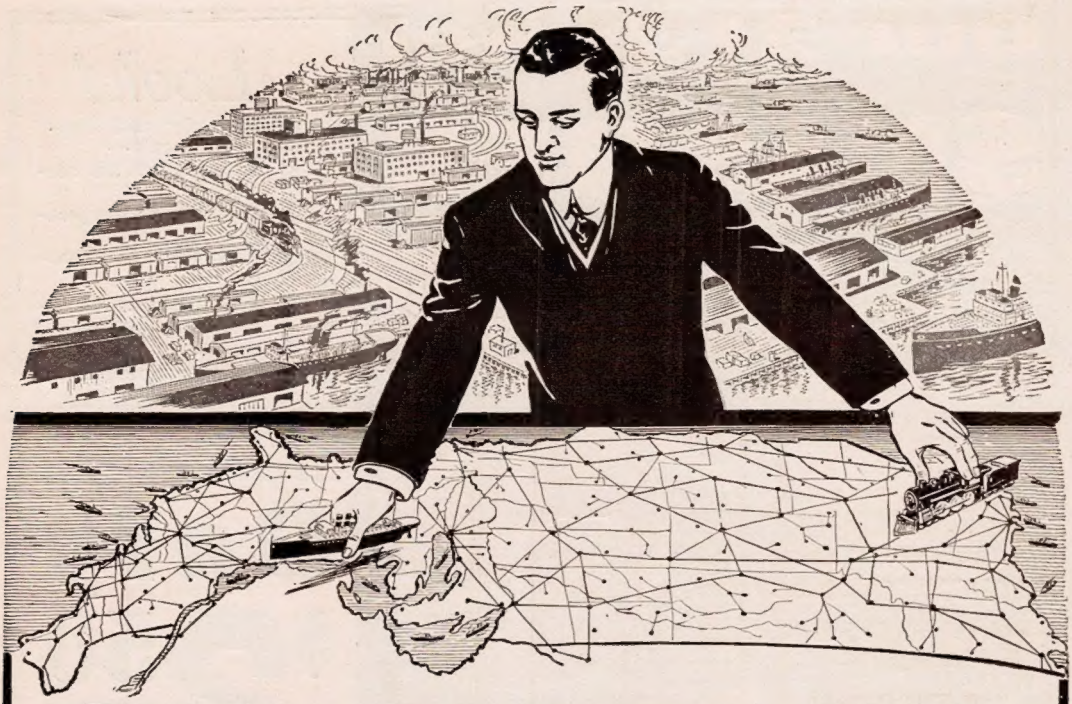

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